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III^e CONGRÈS FORESTIER MONDIAL
HELSINKI 1949
HAEC
BETULA VERRUCOSA
IN MEMORIAM CONGRESSUS UNIVERSALIS TERTII PRO SILVICULTURA DIE XVI MENSIS IULII ANNO DOMINI MCMXLIX INSTITUTA EST
Ce bouleau madré a été planté le 16 juillet 1949 en souvenir du III Congrès Forestier Mondial
This curly birch was planted July 16, 1949, to commemorate the III World Forestry Congress
Tämä visakoivu on istutettu heinäkuun 16 päivänä 1949 III Maailman Metsäkongressin muistoksi
Denna masurbjörk planterades den 16 juli 1949 till minne av III Världsskogskongressen

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A Review of Forestry and Forest Products

November-December 1949 Vol. III, No. 6

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Cover photograph: As a memorial to the Third World Forestry Congress, a curly birch was ceremoniously planted in the courtyard of the Forestry Building in Helsinki. In front of the tree stands the plaque reproduced on the cover. The planting was performed by Professor Saari, President of the Congress; Mr. Charles Granger, U.S.A.; and Mr. T. Petrov, U.S.S.R.

— Cover photograph and photographs appearing on pages 199, 203, and 205 by courtesy of the National FAO Committee of Finland.

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Third World Forestry Congress

By the STAFF OF FAO'S DIVISION OF FORESTRY AND FOREST PRODUCTS

The first World Forestry Congress was held at Rome in 1926, the second at Budapest in 1936, and the third was planned for 1940 with the Government of Finland as host. The war, however, intervened and all thought of the Congress had to be postponed. It is a happy omen that the peaceful and long-range pursuit of forestry could take up again where it had to leave off for such a destructive and short-term activity as war and that the Government of Finland was again prepared to extend its hospitality to a gathering of the world's foresters. FAO's Annual Conference at its Geneva session in 1947 gladly accepted Finland's proposal of Helsinki as the site of the Third World Forestry Congress.

The preparatory work done by the Organizing Committee set up by the Finnish Government was truly remarkable, and the results will be gratefully remembered by all those who attended the Congress. Professor Saari, the Chairman of that Committee, Mr. Leppo, his Secretary-General, and the members of their staff are indeed to be congratulated.[1]

The World Forestry Congresses have provided an opportunity for foresters from all parts of the world, who come as individual experts and specialists, to express their convictions and their experience, to exchange ideas, and to enlarge their horizons by getting a global view of their common or different problems. Therein lies their value and their usefulness.

THE Food and Agriculture Organization of the United Nations is greatly in debt to the Government of Finland for its willingness to undertake the difficult task of organizing the Congress. No country could have given the participants a more hearty and generous welcome. In his address to the second plenary meeting, the Director of FAO's Division of Forestry and Forest Products set forth the significance of the Congress' deliberations for the work of FAO; and this article examines the findings of the Congress with the purpose of seeing whether in the fields of forestry and wood utilization, considered both separately and as a whole, trends and principles have emerged that will provide guidance and assistance in formulating national, regional, or international policies.

Difficulties Encountered

The Congress achieved important and significant results, but it achieved them only after surmounting certain difficulties which, although perhaps inherent in the character of such an assembly and, as such, inevitable, did constitute obstacles.

A minor difficulty was the matter of language. A fact expressed in the language of one expert by a specific term very often appears to assume an entirely different meaning when translated into English or French, the official languages of the Congress, to say nothing of the difficulty of conveying exactly the same idea even in these two languages.

This difficulty was formally recognized by the Congress, which recommended the preparation of a forestry dictionary in the major languages of the world. Such a dictionary should not only list translations of terms; it should also give precise definitions of the terms most commonly used in forestry and of the more important phrases of the forester's vocabulary. This must be a very long-term project which will require the collaboration of many experts in all the countries concerned.

As it turned out, one of the main difficulties that arose during the deliberations stemmed from the somewhat ambiguous status of the members of the Congress. It is a generally accepted principle at international meetings that if governments have not been directly invited to send official representatives, delegates are presumed to be speaking as private individuals, as experts who are voicing their own opinions and who cannot commit their governments by their utterances. There is naturally a tendency at world meetings for participants to form national groups that have the appearance but not the juridical qualifications of a national delegation. Nevertheless, the loose application of the term "delegation" somewhat confused the issue between personal opinions and official policies in this case.

Furthermore, countries were very unevenly represented numerically. Only one or two delegates had been able to come from some countries of great significance in the world from the general economic standpoint as well as from the standpoint of forestry, such as India, Pakistan, and the major Latin-American countries.

All this was of minor importance as long as the Congress limited itself strictly to the discussion of scientific or technical problems. Naturally, agree-

[1] Officers of the Third World Forestry Congress are listed on back cover.

Opening meeting of the Third World Forestry Congress in the Great Hall of the University of Helsinki; the President of Finland, Mr. Paasikivi, delivering his address.

ment on such questions was not always unanimous, but in those cases it was sufficient for the Congress to record the different points of view and conflicting opinions. However, certain technical problems touch closely on forest policy. It was perhaps a mistake that the words "forest policy" were included in the designation of one of the sections of the Congress. The national forest policy of each country is determined by the country itself. It is naturally based in part on technical considerations, but also on the country's economic and social requirements. Misunderstandings might perhaps have been avoided if the subject matter for this particular section had been described as "economic and social problems." As the Director of FAO's Division of Forestry and Forest Products was careful to point out, national government policies, such as national forest policies, should not be discussed at international meetings except by official representatives of the governments concerned. This consideration was not always kept clearly in mind by some of the delegates, and if unanimity was finally achieved on the most important question raised in this section, it was only after a somewhat lengthy debate.

Despite obstacles of this nature, the Congress achieved tangible and worth-while results. The separate conclusions of the five sections of the Congress can be grouped under two headings:

The International Aspects of Forestry Problems

In the first place, the Congress gave recognition to the importance of forests on the international plane, this importance stemming from their protective utility and their productive utility. This is not a mere statement of principle, it is the recognition of a major fact. Foresters and technicians of the wood-using industries throughout the world will differ on details; in no two places are problems identical, and the answers must also vary with latitude and longitude. But they all share at least the same fundamental concepts of the utility of forests and sustained yield, which constitute the basis and justification for forest policies. Furthermore, such ideas are no longer confined to a small group of specialists: in each country they appear to be increasingly recognized, not only in government circles but also by the public at large. This habit of thinking, common to both foresters and timber specialists in all countries, coupled with an increasing understanding of international co-operation which appears to be the mark of advancing civilization, should naturally lead to general recognition of the international significance of forests and wood-using industries.

Evidence of this was given in the general recommendations on forest policy which the Congress extracted from the findings of the various sections and embodied in the early part of its General Report. These recommendations expressed the desire of the assembly that FAO should submit for the consideration of its member governments a statement of basic forestry principles, the elements of which the Congress itself had already evolved. It was also recommended that FAO assist those nations which are now formulating their forest policies and, finally, that the

Annual Conference of FAO explore whatever further steps member governments consider appropriate for the application of these principles.

The import of such recommendations in what might be termed the forestry history of the world is quite clear. For the first time, the specialists of all nations have unanimously assented to the need for international action in the field of forestry. The principles underlying such action have been indicated. The international organization charged with the task of codifying and implementing them has been designated. As specialists, the members of the Third World Forestry Congress could perhaps have gone further. They did respond admirably, however, to the appeal made at the opening of the Congress by one of the veterans in the field of world forestry, Mr. Fjelstadt.

A Broader Concept of Forestry

The second idea which has been brought out very clearly by the work of the Congress is one that has been repeatedly stressed by FAO's Division of Forestry and Forest Products.

This idea is that the sciences and techniques of forestry should not be limited to the solution of silvicultural problems as ends in themselves. Closely bound up with "forests" as a whole, and even with each individual forest, there is a whole set of physical, economic, industrial, and social factors which must be taken into consideration. The relationship is so close that none of these factors can be considered independently, and together they form a new and broader concept of the term "forestry."

For example, although foresters have undoubtedly always realized that their forests constituted an essential factor in the protection of agricultural soils and the regulation of water flow, they have not perhaps clearly understood until recently exactly what role they were fitted to play within the general organization of national soil conservation services; perhaps their ideas as to their responsibilities have now been somewhat clarified. Again, certain social problems are involved that directly affect forest workers and workers in the wood-using industries; others, broader in scope and deriving from the protective utility of forests, affect both rural and urban populations.

The most striking example of the emergence of a new way of thinking, of this broader concept of forestry, is the idea of the close interdependency between the wood-using industries and the "forest." The Congress recognized, and clearly states in its report, that the forest cannot be regarded separately from the industries to which it supplies raw materials. The forester must adapt his methods of management so as to produce the amounts and kinds of forest products needed by industry. In the same way, it is the responsibility of technical research and industrial development to adjust conversion methods and uses to the limitations and requirements of sound silviculture. This basic principle was recognized by both foresters and businessmen attending the Congress, and thereby assumes a major significance.

The Work of the Sections

The work of the several Sections can now be discussed in greater detail. It was principally in Section I, devoted to pure silviculture, that the trends discussed above became most apparent, although perhaps they were formulated more definitely in Section III.

Section I—Silvics and Silviculture

From the purely silvicultural aspect, one trend—a trend toward "industrialization"—seems to be clearly evident from the discussions of the Congress. Strongly influenced by developments in plant geography and ecology and by progress in the study of the evolution of vegetative associations, foresters generally inclined from about 1920 towards a type of silviculture which aimed at minimum interference with natural succession and at allowing stands to develop as nearly as possible into climax forests.

Although ecological laws have in no wise lost their authority, foresters have lately come to observe that, while under certain circumstances the climax species are also the most valuable from the point of view of industrial requirements, in other cases the so-called "pioneer" species are of greater economic importance. It is then the duty of the forester to interrupt the natural evolution toward a climax forest at the stage when this pioneer growing stock has been established, still making provision for the conservation of the forest and respecting the principle of sustained yield. Very often the crop of greatest economic value may be completely artificial, obtained by planting species entirely foreign to the locality. In many parts of the world, exotic softwood stands of this sort have been established and constitute the only crop of any value.

This trend is evident also in connection with the exploitation of virgin forests. One group of tropical foresters appears disposed to reject the process of slow improvement of mixed tropical forests and to adopt more or less drastic methods of replacing them, either naturally or artificially, with homogeneous crops consisting entirely of species with high commercial value.

It may be stated in justification of this point of view that the trend in silviculture is toward "industialization," not only because man can now intervene more powerfully to make nature serve his needs, but also because stands thus established are better adapted, because of their uniform character, to meet the demands of commercial exploitation and the needs of the wood-using industries in general.

A consequence of this trend is perhaps the increasing attention paid to forest genetics. When pure, even-aged stands are established, in contradiction to the laws of ecological succession, it is obviously desirable that they be composed of varieties or races of useful species which are well adapted to the local climatic conditions, quick growing, and yielding a high-grade wood that is resistant to disease and insect attacks.

How can the establishment of such stands be assured? Here again the trend toward "industrialization" is evident. The old processes of natural regeneration, selection of good seed bearers, progressive elimination of the poorer and least desirable trees—in short, natural selection as practiced for many centuries in countries where forestry has been an established practice—now seem slow and uncertain. Even nursery stock or plantations raised from seeds harvested from élite, carefully selected natural stands now appear inadequate to many technicians. They

believe that the solution for the future lies in the establishment of seed "orchards" which would, by modern methods of grafting and propagation by cuttings, make possible the rapid harvesting of forest tree seeds whose origin could be postively certified.

The Congress did not discuss the prospects open to the silviculturist through taking advantage of the phenomena of heterosis, hybridization, and polyploids. It would not be a misinterpretation of present-day trends, however, to say that many foresters already anticipate an even more intensive "industrialization" of their crops, of which at least the élite trees would be grown from seed drawn directly from forest genetics laboratories.

But foresters who are beginning to work along these lines are under no delusion as to the possible serious dangers that may threaten the growing stock which they establish. The laws of nature cannot be flouted without running such risks.

These dangers are particularly vivid to European foresters, who have before their eyes the comparative failure of attempts to establish pure, even-aged coniferous stands over vast areas in the heart of their continent. Although a few specialists regard this failure as a peremptory warning to conform more closely to fundamental ecological laws, the majority see in it no more than an indication that much more research is needed to discover better methods of raising this sort of forest and of avoiding the very serious disadvantages entailed by their homogeneity.

This explains the lines along which forest research is today being directed. The most obvious dangers which threaten crops maintained artificially in an unbalanced state are disease and insect attacks. Despite careful methods of stand management and the increasing efficiency of certain direct, but unfortunately expensive, methods of fighting such attacks, the only real hope in the struggle against disease and insect pests lies in genetic research.

The greatest danger, however, certainly lies in the degradation of the forest soils, or, at least, the gradual loss of soil fertility which ensues under stands for which the soil is not naturally suited. Less spectacular than the results of disease and insect attack, the effects on the soil become apparent only after a long interval, sometimes only in the second or third rotation. Yet the basic duty of the forester is to maintain the fertility of the soils which support his tree crops and to conserve land productivity. Therefore, research on forest soils should be assigned primary importance in silvicultural research. Attention should be concentrated on studies into the evolution of soils under the influence of various types of tree cover and of humus formation. Until recently, attention was focused mainly on the chemical composition of soils and their chemical evolution. Several papers presented to Section I illustrated the importance of soil biology and, particularly, of a detailed study of the micro-fauna, variations in which apparently not only have a decisive effect upon the physical and chemical properties of soils but also constitute a very sensitive indicator of their evolution.

It is through such research that foresters hope to be able to detect dangers menacing forest soils and to find means of allaying these dangers and of restoring or conserving the original soil fertility. Among such means are the application of fertilizers and soil cultivation. For the future, however, the most commonly accepted method will be the introduction of understoreys, particularly of broadleaved trees, under pure softwood stands.

It is not surprising that strong opposition was voiced to the trends sketched above. Exponents of a silviculture which adheres closely to natural succession strongly expressed their disapproval both with regard to tropical forests and forests of the cold or temperate zones. Too narrow a viewpoint, however, cannot be supported. Foresters have to consider the separate requirements of specific regions and the needs of local wood-using industries. In some parts of the world, such as central and northern Europe, forest growth tends naturally to develop into climax types of great economic value, thus obviating the need to counteract normal succession. On the other hand, over great stretches of the Mediterranean and Atlantic areas, foresters cannot allow trees to grow which are either entirely valueless or which industry finds it difficult to use, for the result of such a policy is that forest owners lose interest in their land and their forests. A parallel can well be drawn here between Old World areas and the Atlantic, Pacific, and Northern zones of North America.

Further arguments were set forth on both sides. It was pointed out that the establishment of exotic softwood species sometimes represented merely a reconquest of the land by foresters, since some species, previously eliminated from their natural range by climatic changes and unable to re-establish themselves when conditions again became favorable, were now being re-introduced by man. It was also noted that the establishment of artificial plantations on any specific site might afford a means of recreating the environment necessary for the gradual reconstitution of the original natural forest.

In this discussion sufficient weight was perhaps not given to possible developments which would enable industry to utilize raw materials today considered entirely valueless or of little value. Some of the arguments voiced in favor of what we have called the "industrialization" of silvilculture would no doubt lose some of their force when confronted with the success achieved by wood-using industries in certain areas in using raw materials which hasty judgment had previously classed as useless.

To complete the picture of these trends, it should be added that differences of opinion seem to disappear entirely when foresters, whether hailing from tropical regions or other parts of the world, are dealing with forests whose prime function is protection rather than production. In these cases the need for caution in silvicultural treatment is generally recognized. Any practice or technique which involves leaving the soil dangerously uncovered, which may cause erosion or loss of soil fertility (the soil being a delicately balanced complex in tropical climatic conditions), or which may obstruct the regeneration of cut-over stands, must be rigidly eliminated.

All that has been said above clearly shows the great efforts that are being made by silviculturists to satisfy the requirements of wood-using industries and human needs for wood generally. It is hoped that research now in progress will secure the results desired and that these will be applicable on a vast scale. But a certain amount of caution must be exercised. If current practices are found to lead to the gradual loss of soil

fertility, the basic capital of mankind, research workers must unhesitatingly revert to observance of the major natural laws, in the knowledge of which great progress has been made and on which research continues to be pursued with the greatest assiduity.

Section II—Forest Surveys

The subject matter for Section II at first glance appears highly technical and of interest only to specialists in these difficult questions. This is a very superficial judgment, however, and the discussions demonstrated the essential role of the techniques of sampling and forest inventories in the composite picture of forestry and wood technology. It was pointed out that one of the principal reasons for failure in the exploitation of virgin forests is lack of knowledge or erroneous evaluation of resources in the forests to be opened up.

A solution of the problems raised in Section II is, therefore, of concern not only to the silviculturist but also to wood-using industries. Knowledge of resources is the very basis of all forest policy, for just as the scientific management of an individual forest cannot be undertaken without an accurate knowledge of its size, its geological, soil, and topographical features, the growing stock, and the annual growth, so no valid forest policy having definite economic and social goals can be laid down without an adequate knowledge of the forest domain to be managed.

This was the main conclusion reached in the deliberations of this Section. It should be carefully noted by the many countries which still hesitate to allocate the funds necessary for forest surveys and inventory operations.

Furthermore, recognition of the international importance of forestry also imposes another obligation upon countries. Not only do methods of estimating standing timber volume, cut, and losses due to natural causes vary from country to country, but the results produced by these methods are seldom comparable. The use of different units of measurements may be only a minor inconvenience, but the varying classifications of types of timber, the inclusion or exclusion of certain portions of trees in inventories, the different methods of evaluating data, all make the compilation of uniform information extremely difficult. FAO is greatly encouraged by the recognition given by the Congress to its efforts towards securing comparable information. However, a considerable amount of work still remains to be accomplished, which FAO is in the best position to perform; this the Congress commissioned it to do.

Section II also studied inventory methods which should be employed to improve knowledge of all aspects of the national forest domain. The most important of these methods is aerial photogrammetry, which has come into general use during the past few years. The great promise of this method was generally recognized, but the specialists warned foresters against undue optimism in view of the present state of development of this technique. Despite successes in specific instances, ground operations cannot be dispensed with in securing an accurate knowledge of forest resources. Aerial photography, aside from the tremendous possibilities it affords for the collection of topographical and planimetric data, may produce considerable simplification in inventorying by sampling. It can often increase the accuracy of this method and lessen the cost. At present, however, it does not eliminate the necessity for carrying out ground surveys.

Of comparatively recent introduction into forestry, the technique of aerial photography, supplemented by ground sampling, has wide application, depending on the country in which it is employed. Each country will seek a different method of attaining the results which it desires, but in each instance there is doubtless one method which is more efficient than any others. In this field, where rapid progress is continually being made, it is therefore extremely important that foresters should keep abreast of the progress being made in various countries. This is precisely the purpose of the survey now being undertaken by FAO, which should be valuable not only because of the assistance which it may render to foresters everywhere, but also because it may stimulate the tabulation of results of national forest inventories in uniform, international terms.

Another of several problems considered by Section II was the determination of forest increment, which entails the solution of many difficult questions. The study of this subject was entrusted to the International Union of Forest Research Organizations.

It is appropriate here to call particular attention to the question of the relation of forests to water supplies. The interest aroused by studies of this question proves that foresters are endeavoring to incorporate the surface areas for which they are responsible more intimately into the economic life of each country. It was commendable that this Section, which was concerned with forest production and the direct utilization and evaluation of the resource, should also have concerned itself with the indirect utility of forests and the means of evaluating this aspect.

Experiments conducted over a period of years and still being continued in many countries have shown the influence of the forest cover on run-off, stabilization of water flow, and control of floods. Unfortunately, in many countries the functions of forests and their effect upon entire catchment areas and upon the prevention of floods are entirely overlooked. Furthermore, even in some otherwise well-informed circles, the belief still exists that a well-constructed system of dams, storage basins, and other hydraulic engineering works can by itself remedy disorder in the water regimen of any catchment area, whereas in reality the permanent correction of any disorder and of its impact upon soil stability can be accomplished only by restoring and maintaining on the catchment area an adequate and properly distributed forest cover.

The Third World Forestry Congress is to be commended on the formulation of its statement on this subject. It expresses the aroused consciousness of foresters as to the enlarged scope of their role in the economic and social spheres in each individual country. It is to be hoped that they will call public attention to the inadequacy of the role generally assigned to forests and foresters in over-all programs of soil conservation, soil rehabilitation, and the protection of other natural resources.

Section III—Forest Economics, including Forest Policy

Reviewing the most urgent current economic and social problems in forestry, the discussions in this

Section were followed with great interest by the members of the Congress.

Many of the points covered have already been mentioned. For example, the desire for a clearer comprehension of the terms which recur constantly in the vocabulary of forest economists, and for a more generally acceptable international terminology, was expressed in the paper on "sustained yield" presented by Professor Saari, President of the Congress, and in the subsequent discussion. Foresters appear to be in essential agreement as to what they consider the real meaning of this term to be. Applied to a specific forest, it has "dynamic" implications that the objective sought is a continuous yield and also a maximum output both by quality and quantity, so that a better expression might be "progressive yield," as suggested by Professor Saari.

The discussion of afforestation problems again illustrated the marked preference for softwoods and

The President of the Third World Forestry Congress, Professor Eino Saari.

quick-growing deciduous species suited to industrial demand. However, stress was also laid on the social aspects of afforestation, which provides employment opportunities, helps to keep people on the land when agricultural work alone cannot provide full subsistence, and sometimes even results in the re-establishment of centers of population in long-deserted areas.

Another topic considered by Section III was the relation of agriculture to silviculture in rural economy. The role of forests in providing stability to rural populations, either as a source of employment or as a source of income, was clearly demonstrated. In the major forestry countries, forests are the principal element in creating and maintaining stable communities; in the major agricultural regions, they also exert a considerable influence. These facts have already been widely recognized.

This question is intimately related to that of employment or unemployment of forest workers and workers in the wood-using industries, because agricultural communities supply the major portion of the manpower for forest exploitation and sometimes also for mills and factories, at least in countries where small forest holdings predominate. The responsibility of foresters and timber specialists becomes greater when the economic activitiy of an entire region is dependent upon forests. Such a situation requires not only a guarantee of stable employment to workers, but also, despite improved living conditions already achieved, the right to seek and enjoy even better working conditions, housing, nutrition, and social security.

The preceding statement shows sufficiently the correlation between all questions relating to forestry, timber, and the wood-using industries. After this Third World Forestry Congress, it should be impossible to speak of silviculture without having regard to the influence of various types of silviculture upon the entire wood-using industry, on the environment of forest and wood industry workers, on the economic evolution of rural communities, and on the composite picture of economic and physical conditions in an entire country or region or in the whole world. Inversely, fluctuations in equilibrium of any one of these factors will react upon the others and upon silvicultural practice itself.

This interdependence of technological, economic, and social factors is particularly apparent in the problem of exploiting virgin forests. The findings of Section III clearly demonstrate this by emphasizing that in some regions or countries where research is advanced and silvicultural techniques have been sufficiently perfected, the solution of this problem depends mainly on finding capital investment; elsewhere, particularly in tropical regions, investment opportunities wait upon progress in research and upon intensification of research. In the first case, the opening up of virgin forests is contingent upon the construction of road networks, the installation of railways, and the construction of mills for converting lumber and other forest products; capital can readily be found if a steady and adequate return on investment is assured. In the second case, on the contrary, reliable markets for forest products must first be found so as to assure a steady outlet for the volume of production needed to attract and hold a sufficiently large labor force. Only with stability can the vast amount of capital required for the exploitation of virgin forests be attracted to create new enterprises.

Section III specifically emphasized the advantages of combining agricultural and silvicultural activities, particularly in the reconstitution of tropical forests, by adapting traditional agricultural methods. The importance of close collaboration between farmers and foresters was stressed. The future of at least the major almost uninhabited forest regions of the world depends on such collaboration, which has already repeatedly demonstrated its potential value. We may see here perhaps a formal condemnation of projects that have recently been brought up for the purely agricultural colonization of such areas. A statement was inserted into the General Report of this Section to the effect that it might be preferable to import food supplies for local populations in order to alleviate the pressure exercised on the forest by their requirements for crop and pastureland. In many cases this solution would be better economic practice than permitting the disappearance of the forests, with all the serious consequences involved.

Section IV—Forest Utilization

Despite the interest of the two general papers presented to this Section—one on work methods in the

temperate zones, the other on the organizational set-up for the exploitation of tropical forests—it must be admitted that the work of Section IV was the least popular among the delegates to the Congress.

Nevertheless, the contrast between these two reports produced one extremely interesting result. In some countries where the forests are comparatively homogeneous and where intensive silviculture is being or can be practiced, careful studies are already being made with a view to increasing efficiency in extraction operations and lessening the amount of labor required. The day is foreseeable when such work will be more or less standardized as a result of improvements emanating from such research, the mechanization of the industry, and vocational training of the manpower employed. Eventually, the perfecting of industrial techniques will lead to improvement of forestry methods or will facilitate the application of improved methods. In mixed tropical forests, conditions are very different. They vary to such an extent that no standardization of extraction methods seems possible as yet. The mechanization of logging and transportation operations would be a desirable step forward, and much has already been accomplished along these lines, but the mechanization of actual felling operations is difficult. At any rate, it has so far been found impossible to reduce factors of time and labor in such work to a single common denominator permitting any measurement of efficiency. Possibly in the near future advances in silviculture will lead to improved methods of exploitation.

The existence of this contrast suggested to Section IV the submission to the Congress of a recommendation that an international conference on tropical forestry be organized under the auspices of FAO. This recommendation received the unanimous approval of the Congress. Although a sufficient number of tropical foresters attended the Congress to point out the main trends in tropical silviculture, there were too few of them to consider in detail the problems of the treatment of such forests and of the wood-using industries of these regions. Forestry and timber technicians are aware that "all forests are one," as the title of our review suggests, and that the future of their own forests and forest industries depends in a large measure on the development of tropical silviculture in the coming years.

The Section stressed the close inter-relationship between social welfare, labor, and economic problems in forest exploitation; it further emphasized that industry technicians must solve the economic problems, while the task of solving silvicultural problems devolves upon foresters. It recognized the necessity of setting up training schools for forest labor and the importance of increased efficiency in forestry work. It recommended that FAO's Division of Forestry and Forest Products continue gathering and distributing information on logging equipment and techniques. Finally, it recommended the establishment under FAO of a body for the purpose of co-ordinating time studies in forest work and all other methods of study related to various types of hand tools and mechanical harvesting devices.

Section V—Forest Industries

The work of Section V pertaining to forest industries was highly interesting, not only to the industrialists who attended the Congress, but also to silviculturists.

Beginning with the first plenary sessions, this Section was called upon to deal with an important question raised in a report submitted by FAO and in a remarkable study made by Mr. Streyffert, namely: Is it possible to determine accurately the quality of wood which will be required in the future by industry, and is the trend in industry toward preference for quantity rather than quality?

In the discussion that followed, advocates of the view that quality is more important and the exponents of the greater importance of quantity took turns in presenting weighty arguments. The discussion suffered to some extent from a lack of definition as to what we are to understand by "quality" of wood. As Mr. Streyffert remarked in his report, we are still ill-informed about the effect of the usual type of silvicultural operation, particularly thinnings, on the intrinsic properties of wood, that is to say, on its physical, mechanical, and chemical characteristics.

If we limit ourselves to external evidences of quality, such as clear stems and freedom from knots, does not external quality actually coincide with quantity? Is not the finest stand the one which is located on the best site and which has the maximum growth potentialities? Within the stand itself are not the élite trees, which have the finest appearance, also the best timber producers? Nowadays, therefore, when we speak of seeking quantity rather than quality production, it appears to the silviculturist that we refer only to a reduction in the diameter or age at which trees should be felled, or to the growing of species hitherto little sought by industry, both hardwoods and softwoods.

True, technicians have demanded of silviculturists both an increase in the quantity of wood produced and an improvement in its quality to comply with the requirements of the wood-using industries. Nevertheless, they have also urged that industry develop additional means for the utilization of broadleaved species, small-sized trees, and, if possible, bark. They recognize the importance of the development of wood chemical industries, where the tree size or even the tree species is of only minor importance, for the scientific utilization of forest resources. They stress the need for industries to take into account reduced consumption of fuelwood and to prepare themselves to absorb the additional quantities of wood thus made available. They point out the value of devoting more attention to the manufacture of pulp and the potentialities of utilizing the hardwood species, including tropical species.

It therefore appears that, in the limited sense indicated above, there is a slight tendency to favor quantity over quality production. More explicitly, industry apparently feels able to absorb and transform into valuable commodities wood which is today considered of comparatively inferior grade, provided research is actively continued.

Such an effort on the part of industry would greatly facilitate the task of the silviculturist. However, cooperation does not stop there. Complete utilization of "waste products" is possible, and Section V issued a clear statement recommending the integration of the various wood-using industries as the only possible means of ensuring the maximum economic utilization.

The integration of factories using wood as their raw material has become an actuality in several countries. In any case, there is a very clear trend in this direction. The Congress confirmed this trend and recognized its economic importance.

We are all aware, however, that the stability of such integrated industries is possible only if a continuous supply of raw material is guaranteed; that is, if this grouping of plants is associated and integrated with a suitable area of forestland, properly managed to meet the requirements of the whole group.

This concept of the "forestry combinate," which FAO's Division of Forestry and Forest Products has repeatedly endorsed, received the approval of the Congress in principle.

Although nothing which concerns wood-using industries is a matter of indifference to silviculturists, the other recommendations of Section V concerning wood preservation and the development of the prefabricated house industry are possibly of more limited influence upon the general orientation of silviculture.

Field Trips

No picture of the Third World Forestry Congress would be complete without reference to the field trips that took place before the Congress convened. Many delegates to the Congress, visiting Finland for the first time, found these trips a revelation of silviculture developed in harmony with the evolution of the wood-using industries.

The visitors were introduced to the rural and industrial life of Finland, which is so intimately bound up with forests, and to the splendid Finnish hospitality. All of them are grateful for this hospitality and can not but have retained the most pleasant memories of it. Furthermore, the excursions were conducted by the most eminent foresters of the country, who, with their experience, could provide a ready source of information for each visitor.

A variety of trips was possible, enabling each member of the Congress to select the tour in which he was most interested. Because so much ground was covered, it is difficult to do justice to the excursions. We emphasize here two problems of particular interest.

When we refer to "problems," we do not mean matters that are either incapable of solution or unsolved. On the contrary, the two problems to which we allude can be considered as having been solved in principle, if not in practice. But we simply wish to indicate that, side by side with its magnificent achievements, Finland also has its own special forestry problems. One might be tempted to overlook this fact because of the fine aspect of Finland's forests and because of the seeming ease of silvicultural practice in this country, where only rarely is it necessary to interrupt the natural succession toward climax forest.

Two or three figures will suffice to give an idea of the over-all importance of these problems. Over the forested area of 21,670,000 hectares, annual growth amounts to only 40.8 million cubic meters, or approximately 1.9 cubic meters per hectare. Visitors were able to inspect experimental plots and even whole stands which, although located on poor soils and in the northernmost parts of the country, exceeded this figure, sometimes yielding more than 10 cubic meters

Planting the curly birch as a memorial to the Congress, in the courtyard of the Forestry Building at Helsinki. Alongside the curly birch is the plaque which is reproduced on the cover.

per hectare. Naturally it would be utopian to expect that, in such a cold climate and on generally poor soils, average production could reach such high figures. On the other hand, these figures clearly show that there is still ample opportunity for Finnish foresters to increase their forest production.

Reclamation of Marshlands

A means by which Finnish foresters could increase forest increment, and thereby national forest production, is through the afforestation of unproductive lands; the same applies to many other European countries.

In Finland, unproductive areas comprise mainly marshland, the major portion of which is already included in the total area of forestland. They carry only poor stands of low productivity or are sometimes even completely treeless. The foresters propose the afforestation or improvement of these marshlands.

Of course, not all marshlands are reclaimable and not all can be put under forest, and the same methods are not equally applicable in all areas. However, a proper system of drainage would, in many instances, suffice to achieve results such as could be admired by many of the delegates to the Congress. Stands were seen where the drainage of marshlands, whether accompanied by sowing of seed or artificial planting, or even without such measures, had increased the volume per hectare of standing timber from a few cubic meters to a figure ranging from 200 to 300 cubic meters within a period of 40 years, while the average annual increment, previously less than one cubic meter, was increased to from 4 to 8 cubic meters.

Efforts are still being made to improve the results of drainage by applying calcium in various forms, wood ashes, or sand, but drainage techniques have now been perfected to the point where the only difficulties are manpower, financing, and mechanical equipment. These difficulties impede the carrying out of the program formulated by Finnish foresters to increase the productivity of their forests in a comparatively few years.

Through the continuity it has pursued in implementing this program, the energy with which the task has been carried out for several decades, and the remarkable results already achieved, Finland affords an example to foresters of all countries.

Privately Owned Forests

Privately owned forests comprise approximately 50 percent of the total forested area of the country. Popular appreciation of forests is certainly well developed, and the large private forests, many of which belong to the big timber companies, benefit from enlightened care and regular management.

Nevertheless, as in many European countries, private forests are poorer and less productive than State forests, although very often they are located on more fertile soils, are more easily accessible, and can more readily be subjected to intensive silviculture.

Private forests, therefore, present a problem. In Finland, the problem has been practically solved by legislation which receives the whole-hearted support of public opinion and which will, in a comparatively short time, increase the output of private forests to a rate comparable with that of the State forests.

The law of 11 May 1928, which codified legislation dealing with private forests, merits a detailed analysis. The essential feature is the creation of "District Forest Bureaus," agencies which function under the supervision of the Government and in compliance with official regulations. The Government also defrays their expenses. These Bureaus are each composed of five members, four of whom are appointed by the District Agricultural Associations, and the fifth by the Central Organization of the District Forest Bureaus.

The District Forest Bureaus are assisted by local forest bureaus under the instructions of municipal councils, composed of three members charged especially with handling forestry matters in each commune. Their job is to assure the application of scientific silvicultural practices to private forests throughout their districts. The law stipulates that the function of the District Bureaus is "to promote private forestry by disseminating information as to and knowledge of scientific silvicultural practices, by offering guidance and assistance in forestry work, by encouraging and promoting collaboration in forestry affairs, and by adopting all measures which may serve to develop and improve silviculture."

It also gives the Bureaus enforcement powers. Notification of any tree fellings or forest exploitation must be given in advance to the District Forest Bureau, unless such fellings are purely for domestic needs, thinnings, or form part of an official working plan previously approved by the Bureau. Should these fellings be performed in such a manner that, in the opinion of the Bureau, the condition in which the stand is left or the treatment of the forest soil jeopardizes natural regeneration; or should the felling of young trees not seem to the Bureau strictly to constitute thinnings; or should the cut-over area be burned in a manner inconsistent with the best land utilization practices, the Bureau may intervene and impose a "closure" penalty upon the proprietor.

The closure entails either a prohibition against felling timber or against using the forest soil in any manner whatsoever, or both. It may also, if necessary, require the taking of measures stipulated by the Bureau to assure the regeneration of the forests at the expense of the proprietor.

While such legislation greatly encourages the achievement of a sustained yield in all forests throughout the country, it does not impose any obligation upon a proprietor to do so; and even less does it oblige him to attain a "progressive yield," in the sense of the term used by the Congress. However, it approaches very near to this goal, and the sole factor which prevents its attainment is that the District Forest Bureaus lack the power to prevent premature exploitation of a stand or to require a suitable age gradation in each forest. But there is no doubt that, by using powers of persuasion wisely, along with their powers of enforcement, the Bureaus readily fulfill their purpose and impose on practically all forests under their supervision true scientific management, if we define such management as the application of a sound conservation policy on a sustained-yield basis.

The manner in which the two problems just reviewed have been handled by Finland is an excellent example of the efforts being made by the foresters of the country. In setting such an example and many others before the Third World Forestry Congress, Finland's foresters have rendered a signal service to the specialists from all over the world who received such a gracious welcome in their country.

Commodity Reports

Forest Products

Situation and Outlook, 1949/50 *

THE chief problem affecting supplies of forest products lies today in the field of international trade and is intimately tied up with maladjustments in international exchange. A shrinkage in the flow of dollars abroad, due to general cuts in United States imports, has caused other countries, notably the United Kingdom, to scale down their lumber imports from Canada and the United States and to seek supplies outside the dollar area. Production in softer currency countries capable of producing export surpluses has thus been stimulated, while stocks have tended to accumulate in North America. At the same time there has been a virtual cessation of United States purchases of wood pulp from Sweden, Finland, and Norway, which have depended heavily on pulp exports to balance their dollar trade. These countries produce over 60 percent of exportable world supplies of pulp, and the closure of American markets could result in a shift, temporary or permanent, to alternate markets.

World output of roundwood in 1949 is expected to be slightly below the 1948 estimate of 1,440 million cubic meters,[1] declines in North America and the Far East[2] probably more than offsetting gains in the Soviet Union, Europe, and the dependent territories of European nations, plus minor increases in Australia and New Zealand.

The features of the 1949 situation will probably be as follows: World lumber production will fall somewhat below the 1948 level, as the North American reduction will exceed increases elsewhere. A relatively large reduction will occur in pulpwood output, because stocks at pulp mills are high. Some of this timber will be diverted to the production of pitprops, which will be slightly over the 1948 level. The output of other products such as poles, sleepers (ties), and hardwood specialties will be at approximately the 1948 level. Total output of veneers and plywood may be somewhat larger than in 1948, but the total for wood pulp will drop below 1948, although some new mills will have come into production.

Domestic stocks of primary forest products in North America, normally representing three to nine months' production, are sufficiently large in relation to likely internal consumption levels to meet any deficit in production through the remainder of 1949 and 1950. The change from a sellers' to a buyers' market has caused relatively slight declines in internal prices, but the accumulated stocks may induce a selling drive that would result in a further fall in prices. This in turn could stimulate construction activities and paper consumption.

The over-all decline in forest output, if these forecasts are accurate, is likely to be moderate. It will occur in countries that could readily raise production in keeping with an expansion in economic activity; and although there may be little change through 1950, reports of member governments to FAO show expectations of a recovery in output in 1951.

At this stage there will be a new force to reckon with—the re-emergence of both Germany and Japan as importing countries of major significance (and as exporters of manufactured products). Import requirements of Bizone Germany for 1950/51, as reported to FAO, are as follows:

	Thousand cubic meters	
Sawn softwoods	366.1	(About 80,000 standards)
Sawn hardwoods	58.8	
Pitprops	720.0	
Pulpwood	810.0	
Veneer/plywood	3.8	
Poles and piling	30.3	
Other industrial wood	2.4	
TOTAL about	2,000	

Japanese requirements for 1950 are reported to be in the order of 240,000 cubic meters of sawlogs and veneer logs, but only about 5,000 standards of lumber. Before the war Japan imported about 300,000 standards of lumber annually. But it also drew on Korea and Manchuria for supplies, which were not classified as imports.

Looking much farther ahead, if wood consumption of the underdeveloped countries were to approach the levels current, for example, in Switzerland or New Zealand, it would be necessary to double the present volume of world output of wood.[3] The forests of the world, given reasonably good forest management, could progressively supply yields of this magnitude.

*This article was written prior to the date of announcement of the recent currency devaluations. It is not possible, at this point, to gauge exactly how the devaluations will affect the outlook for forest products.

[1] See FAO, *Yearbook of Forest Products Statistics — 1949*. (In press.)

[2] The decline in the Far East reflects disturbed political and social conditions.

[3] Progress in the underdeveloped countries is tied closely to industrialization. No country has ever attained success as an industrial nation without an ample, economical, and dependable supply of fuel. Many of the underdeveloped countries depend in large measure on wood for energy production, but wood is not an efficient fuel and in many areas must be brought from increasingly greater distances each year. It is evident that steps must be taken to develop alternative sources of energy.

Canada alone, already the world's largest exporter of forest products, could in the long run more than double its present output.[4]

The declared policy of most governments today is to bring about the maximum use of forest resources, and not to let them lie idle and unused. This is the objective of the United States of America, the U.S.S.R., the British Commonwealth, and Brazil, which in the aggregate hold responsibility for more than 85 percent of the world's productive forest area. There is, however, no evidence that the desired balance between consumer needs and production will come of itself; the nations must continue to bring about an expanding world supply of diverse forest products for a growing world population.

Sawn Lumber

During most of 1948 world output of softwood and hardwood lumber continued to show the upward trend characteristic of the postwar years. Production increased from some 30.8 million standards in 1946 to about 39.4 million standards in 1947 and 41.3 million standards in 1948, a level above the prewar average. Roughly 75 percent of the world lumber output is represented by softwoods.

In Europe, during the latter part of 1948, the lumber markets were comparatively easy except for imports from hard-currency areas. Developments during the first half of 1949 indicate that supplies, at least of the higher grades, are again short. Evidence for this statement is the exceptionally early closing of export sales. By 1 July the Scandinavian countries had contracted for 90 percent of their proposed exports. Strong efforts have also been made by importers to conclude contracts with the U.S.S.R.

In North America, available supplies of both softwood and hardwood lumber appear to have exceeded effective demand in 1948 and the first half of 1949, a situation attributed mainly to the recession in economic activity.

On the whole, effective demand has been influenced in international trade by currency difficulties and in domestic business by a general reluctance to buy in anticipation of a decline of prices. The downward price trend in the lumber industry has been considerably smaller than in the wood pulp and paper industries, and has so far resulted in a weakening of prices for lower grades only.

Table 1.—Indices of Lumber Prices, 1946-49

Country and item	1946	1947	1948	May 1949
	(*Base 1938 = 100*)			
United States (domestic)[1]	204	318	356	326
United Kingdom (imports)[2]	318	405	411	[3]397
Canada (exports)[3]	316	366	377	...

[1]All lumber.
[2]Sawn softwood.
[3]Average, Jan.-May.

The following percentages, based on figures reported to FAO, indicate anticipated levels of lumber production for 1950 in countries covering about 80 percent of world output:

	Production in 1950 as percentage of 1948
Europe	103
U.S.S.R.	180
United States and Canada	94
Australia and New Zealand	109
Japan	85
Weighted average	112

Europe

Output of softwood lumber in Europe (excluding U.S.S.R.) in 1948 was about 33.9 million m^3 (s)[5] or 7.25 million standards, an increase of about 5 percent over the previous year. Output of sawn hardwood totaled 8 million m^3 (s), an increase of almost 10 percent.

At the beginning of 1948, urgent postwar needs for timber having already been met, the effective import demand for softwood lumber (including sawnwood equivalent of sawlogs) of the main deficit countries in Europe was set at 2.1 million standards, in the light of shortages of appropriate foreign currencies and other financial considerations. "Essential needs," defined by countries participating in the work of the Timber Committee of the Economic Commission for Europe as potential requirements, were estimated at a much higher figure—3.6 million standards.

By the end of the year Europe's gross softwood imports totaled 2.3 million standards, of which 1.8 million came from within Europe and 0.4 million (as compared with 0.8 million in 1947) from Canada and the United States. Thus the wide gap between supply and demand in the European timber situation, which seemed evident from the end of the war, changed into a temporary equilibrium in 1948. Because of the general easiness, the ECE Timber Committee recommended that no "buying limits" be set up for the importing countries in 1949.

But this equilibrium is an unstable one. "Essential needs" have not yet been met. In many countries, such as Belgium, the Netherlands, France, Italy, and Greece, building activity in early 1949 suffered a definite setback or came almost to a standstill. All European governments have still to cope with serious housing shortages.

Moreover, there is a major change in respect to Germany. Cessation of German exports of lumber and sawlogs after 1949 will decrease European export supplies by perhaps half a million standards, and Germany's urgent import demands for 1949 have already been estimated at well over 200,000 standards. A first step towards reopening the German markets for timber imports was taken in June 1949, when US$11.25 million was reserved for one year's purchases by western Germany of sawn and planed wood, equivalent to some 65,000 standards, from Sweden. This has been followed by purchases from Finland, and is scheduled to be followed by imports from Austria (which has already made several attempts to regain a traditional German market) and perhaps from Czechoslovakia.

The supply situation may improve as a result of the special credit arrangements now being negotiated for purchases of forestry equipment by certain countries

[4]See *Proceedings of the Third World Forestry Congress*, No. 2, "Forest Resources and Human Needs for Wood."

[5]m^3 (s) = cubic meters (sawn), as distinguished from m^3 (r) — cubic meters (round).

against commitments to increase timber production and exports.[6] These negotiations are being conducted, on the one hand, by the International Bank for Reconstruction and Development in close consultation with the secretariats of FAO and ECE, and, on the other hand, by a number of European timber exporting and importing countries.

The latest estimates of production and exports within the continent during 1949 and 1950 promise a definite improvement in Europe's timber balance. Production may increase by half a million standards in 1949 and by another half million or more in 1950.

IMPORTANT TIMBER AREAS OF THE WORLD

Map by courtesy of Pulp and Paper, *Vol. 23, No. 5, April 30, 1949.*

A slight increase could occur in the Scandinavian and Finnish exports shipments. The Swedish housing program provides for a progressive reduction of timber in the construction of dwellings from the present rate of about 5.8 standards per dwelling unit to 4.8 standards in 1951, and is thus expected to release additional quantities of timber for export. Additional lumber may be available from Finland as a result of a shift from pulp to lumber production.

In view, also, of a probable increase in exports from the U.S.S.R. and possible exports from Brazil, any gap between supply and demand in Europe would be small enough to be filled by exports from North America. But this is where the main problem lies.

The United Kingdom, where the gap between supplies and potential demand is greatest and where the current rate of softwood consumption is down to about 45 percent of the 1934-38 average, was forced in mid-1949 to cut purchases from the dollar area by one-quarter. This new austerity program, therefore, seems to rule out greater supplies from North America, unless special arrangements are made. It does mean, however, that market prospects for European export lumber remain good.

The United Kingdom price lists for Swedish and Finnish goods, agreed upon in April 1949, confirmed the trend toward restoring the spread between prices for higher-grade and lower-grade lumber. On the average, prices went down some 4 to 5 percent from the 1948 level, the drop of some lower-grade prices being 7 to 15 percent. As usual, United Kingdom prices have also influenced prices on other timber markets.

The relatively slight price decline on the lumber market has been strongly felt by the sawmill industries of several countries, where any further downward trend in export prices would reduce forest-workers' wages.

U.S.S.R.

During the period 1935-38 the U.S.S.R. exported an annual average of 1.1 million standards of softwood lumber. Since the war, exports have been almost negligible, Soviet supplies of sawn softwood to

[6] The International Bank granted loans of $2.3 million to Finland and $2.7 million to Yugoslavia on 17 October to finance the purchase of timber-producing equipment. These are two of the series of loans considered in connection with the so-called timber equipment project developed by FAO, the ECE Timber Committee, and the International Bank. Negotiations with Czechoslovakia for a loan for a similar purpose are under way, and Austria has indicated a desire to participate in the project. Poland has been able to satisfy its timber equipment needs without bank financing.

European markets in 1948 being only about 56,000 standards. The position of the Soviet Union is, of course, dependent on the huge reconstruction and housing needs with which the government has still to cope. According to Soviet estimates,[7] the country's losses in output capacity (in terms of current output) during the last war corresponded to 64 million cubic meters of felled timber, or 27 percent of the total capacity in 1940. On the same basis of calculation, the losses in sawmill capacity amounted to 2.57 million standards, equaling 34 percent of the 1940 capacity.

The current five-year plan provided for a production of about 4.6 million standards of sawn lumber in 1948, and, according to official statistics, this target was exceeded. Production is scheduled to attain 8.3 million standards by 1950, or 109 percent of the 1940 output.

Domestic supplies of sawn lumber have been supplemented by considerable quantities imported from Finland, and probably by other quantities drawn from the Soviet Zone of Germany and elsewhere. Since 1945, up to 30 June 1948, when war reparations deliveries of timber were stopped, Finland had shipped 350,000 standards of sawn softwood and 1.22 million cubic meters of roundwood to the U.S.S.R. as reparation and restitution deliveries. In addition, Finnish exports under normal trade agreements with the U.S.S.R. included nearly 52,000 standards of sawn softwoods in 1947 and over 72,000 standards in 1948.

The re-equipment of the Russian sawmill industry has advanced favorably, and reorganization of transport has made possible the exploitation of forests previously inaccessible. A large proportion of domestic lumber needs has apparently been met, and the increasing lumber production has reportedly allowed the building of substantial reserves. Although the resumption of exports on the prewar scale will probably occur only gradually, there is always the possibility that the Soviet Union might in the near future increase its exports very considerably.

United States and Canada

Combined output of softwood and hardwood lumber in the United States in 1948 reached 18.2 million standards, compared with 17.9 million standards in 1947. Of this total, softwood contributed 14.30 million standards, according to industry estimates, as against 14.11 million standards in 1947.

The value of all new construction, both public and private, in the United States will reach a record total of $19,000 million in 1949, according to estimates by the U. S. Departments of Labor and Commerce. Nevertheless, it is expected that domestic requirements in 1949 for softwood and hardwood lumber for construction purposes will, at 11.78 million standards, be 3.5 percent lower than in 1948. An explanation is that total private construction is expected to drop 5 percent from the 1948 level, while public construction, which consumes relatively less timber, will increase more than 22 percent.

United States lumber exports have also declined, the drop amounting to more than 50 percent between 1947 and 1948. During the first half of 1949, exports of combined softwood and hardwood lumber were 15 percent below the rate for the corresponding period of 1948; shipments to the United Kingdom, Argentina, China, and the Union of South Africa had declined considerably, although those to some destinations had increased.

Diminished demand has resulted in a slight decline in production of lumber and lumber products, from 145 percent of prewar in 1948 to 127 percent in the first half of 1949.

As of 9 July 1949, stocks in mills in the main producing centers of the southern states and of the west coast of the United States were more than 35 percent higher than a year before. At the same time, unfilled orders on these mills were about 32 percent lower than a year earlier.

Domestic lumber prices in the United States have fallen somewhat, but most prices for higher grades have remained firm. According to official forecasts, domestic consumption in 1950/51 will attain only about 17.3 million standards, production being about 16.9 million and net imports about 900,000 standards.

Canada's production of softwood and hardwood lumber in 1948 declined by about 14 percent from the previous year, and for the whole of 1949 is expected to be about 2 to 3 percent below 1948.

The Canadian sawmill industry is dependent on export trade to the extent of 40 to 50 percent of its total output, the United States being its principal market. Between 1947 and 1948 Canada's lumber exports dropped nearly 10 percent from the 1947 levels to about 1.2 million standards, 98 percent of which was softwood lumber. Exports to the United States increased from 548,000 standards in 1947 to 824,000 standards in 1948, offsetting to a considerable extent the serious fall in shipments to all other destinations. The United Kingdom, second only to the United States as a buyer of Canadian lumber, took only 286,000 standards, compared with 574,000 standards in 1947. During the first quarter of 1949, Canada's lumber exports further declined by 31 percent below the corresponding period of 1948.

Domestic prices for softwood lumber in Canada remained firm throughout 1948, but export prices, particularly to the United States, declined slightly during the last quarter of the year. Though domestic and export prices for hardwood remained firm, reluctance to accept lower grades was felt. During the first half of 1949, there was a slight drop in prices for lower grades of lumber. In Canada, as well as in the United States, a number of sawmills discontinued operations.

Were it not for payment difficulties, shipments from the United States and Canada could contribute greatly to Europe's reconstruction needs. According to official estimates, the minimum quantities available for export from the United States in 1950 total about 500,000 standards and those from Canada 800,000 standards, after allowing for shipments to the United States at about the 1948 level. There is strong pressure in both countries to activate exports to Europe. Canada is making full use of the efficient service it operates for marketing its forest products abroad, with active representation by both the Federal Government and private business associations, backed by established grading rules.

[7] Quoted in "The Soviet Union Since World War II," *The Annals of the American Academy of Political and Social Science*, May 1949.

Far East and Oceania

Japan is today, as in the prewar years, one of the world's largest producers of softwood lumber, but the present rate of production, 2.03 million standards in 1948, is at the expense of limited forest resources which are being seriously overcut. In the prewar period, Japan imported 300,000 standards of lumber yearly, mostly of softwoods, but also drew on adjacent countries for supplies which were not considered as imports. These supplies are no longer available, and since a reduction in forest output is planned, import requirements are likely to rise considerably.

In Australia the production of sawn timber in 1948 reached a record of almost one million standards, and is expected to rise still further in 1950 and 1951. New Zealand expects to be in a position to export some 70,000 standards by 1955 without in any way depleting its forest resources. Since it is not a hard-currency area, it should be able in a few years to meet some of Asia's demand for softwood lumber.

The Forestry and Timber Utilization Conference for Asia and the Pacific, held under the auspices of FAO at Mysore, India, in the spring of 1949, called attention to means for overcoming the prevailing shortage of forest products in the region by increasing the now absolutely inadequate output of lumber. The development of forest output and trade within the region will be fostered through a projected Regional Forestry and Forest Products Commission.

Latin America

Latin America, with a lumber production of roughly 7.2 million m^3 (s), or 1.5 million standards in 1948, has a relatively low consumption rate. On balance, the region is a lumber-importing area. The only exporting countries of major importance at present are Brazil, Chile, and Mexico.

Brazilian production of softwood lumber was 376,000 standards in 1948, of which 170,000 standards were exported, 90 percent going to South American destinations. Intra-regional and overseas lumber trade slackened toward the end of 1948 and at the beginning of 1949, owing to financial difficulties in Argentina (the most important buyer of South American lumber) and shortages of foreign currencies on the European markets. If Brazil could develop a sawmill industry capable of producing high export quality lumber, production could be stepped up with great advantage. Increasing attention will be paid in the future to the development of the great hardwood forest resources, especially of the Amazon Valley.

Africa

The Union of South Africa in 1946 imported almost twice as much softwood lumber as it produced, namely, 120,000 standards. Imports from the dollar area have since been severely restricted to reduce the drain on exchange, and tight controls have also been imposed on imports from other areas.

In French, Belgian, and some British territories in Africa, output of hardwood lumber or squared logs is rising, considerable quantities being exported to Europe and the United States.

Plywood

Manufacture of plywood, which just before the war was estimated to have attained a yearly volume of 2 million m^3, has rapidly recovered and expanded during the past few years. By 1948 it was estimated at some 3.2 million m^3. The bulk of production is still concentrated in the United States, Canada, Finland, and Japan. The first two countries accounted for nearly two-thirds of the 1948 world total.

Finland, with a production of 210,000 m^3 in 1948, has come very close to the prewar level; output will be increased in 1949. The United Kingdom, Italy, the Netherlands, and Czechoslovakia have surpassed, and France has reached, the prewar figures of production. Some countries, such as Switzerland, have established new plywood industries, using their own wood, but large-scale plywood industries in most of the Western European countries depend mainly on imported supplies of raw material.

The plywood industry in North America has expanded greatly during the last decade.[8] Since the end of the war the Douglas fir plywood industry in the United States has achieved a 70-percent increase in production. However, it is improbable that the 1,738,000 m^3 outturn of the United States softwood plywood industry in 1948 will be exceeded during 1949. Similarly, it is officially estimated that Canada's plywood production will be somewhat less in 1949 than in 1948, when it was 293,500 m^3, although several new companies will have come into operation; through 1950 and 1951 the output of the Canadian plywood industry is expected to average 266,000 m^3.

Output of the Japanese plywood industry since the war has been limited by the lack of logs; in 1948 it reached only 200,000 m^3, less than one-third of the 1940 peak production. If increased imports of logs are obtained, production during 1950 is expected to approximate 250,000 m^3, of which 26 percent will be designated for export.

No precise data are available on current plywood production in the U.S.S.R.; however, veneer output in 1948 was nearly 35 percent greater than in 1947, and is planned to reach a volume of 810,000 m^3 in 1950.

Brazil greatly expanded its plywood manufacture during the war, the development being encouraged by the United States, anxious to develop additional supplies of this strategic commodity. Production reached over 70,000 m^3 in 1946, but capacity has since had to lie idle because the United States market has disappeared and Brazil has not yet developed other export markets. The war also encouraged efforts in some French, British, and Belgian territories in Africa towards establishing hardwood veneer and plywood export industries, which are now yielding good results. There appears to be an important trend in all countries with suitable forest resources towards domestic manufacture of plywood and a reduction in export of veneer logs.

Plywood consumption in Europe is still at less than one-half of the prewar level, since restricted purchasing power has limited effective demand. The United Kingdom, followed by the Netherlands, Belgium, and Denmark, has been the main importer. Plywood ex-

[8] Related products, such as sandwich panels with thin, high-strength faces and relatively thick, low-strength cores, light in weight and economical of material, are also rapidly coming into use for a variety of structures, including houses, boats, and aircraft. The commercial production of laminated wood products also continues to expand as adhesives are improved and gluing techniques perfected.

ports have not yet reached the prewar level, as the U.S.S.R. (with the former Baltic countries) and Poland have been off the market. Now that reparation and restitution deliveries to the U.S.S.R. have been fulfilled, Finland, the largest plywood exporter, should be able to increase its plywood exports to 210,000 m^3 in 1949. United States and Canadian exports have declined. By 1950, competition on plywood markets should be lively, when Poland, Japan, Brazil, and possibly the Soviet Union will have considerable export availabilities.

Pitprops

Generally speaking, the important mining and pitprop-consuming areas in South America, the Rhodesias, South Africa, Australia, India, Japan, and the U.S.S.R. produce their own pitwood requirements or obtain them from nearby sources. The United States, the world's largest coal producer, turns out about one-third the world's pitprop supplies without taking any considerable part in trade. Canada exports the main proportion of its output. Europe is by far the most important region in pitprop production and international trade, accounting for about one-half of the total world output and some two-thirds of the total trade.

Under these circumstances, only the European pitprop requirements present a problem of international importance. The demand depends on mining activity; fluctuations which affect it also affect pitprop production and trade. After the war the demand for pitprops in Europe was largely met by calling upon the national forest resources of the countries normally importing pitprops and by considerable shipments from Canada. The Soviet Union, one of the great suppliers of prewar years, has not yet re-entered the pitwood market. Poland, after acquisition of the Silesian mines, has changed from an exporting to an importing country, while Germany has been temporarily self-sufficient.

With these changes in the supply–demand pattern, European production, supplemented by imports from Canada, made it possible to cover the requirements of European collieries in 1947 and 1948. Production of pitprops in Europe increased by about 8 percent from 1947 to 1948, while imports from Canada simultaneously declined by nearly 12 percent. The ECE Timber Committee has found that against an estimated import requirement for 1949 of 5,342,000 m^3, there is an estimated export availability of 5,524,000 m^3, which, having regard to the improved stock position at the beginning of the year, indicates that supplies will be fully sufficient.

This satisfactory position for 1949 has been brought about partly by developments in the pulp market. Pulpwood competes keenly with pitwood, and the recent decline in demand for pulpwood is expected to give impetus to increased output of pitprops.

Imports of Canadian pitprops by the United Kingdom declined in 1948 and again during the first five months of 1949. The new dollar-saving program of the United Kingdom will presumably result in further cuts through 1949-51.

Plans have been made for a rapid development of pitprop production in Japan. Output reached the quantity of 2.1 million m^3 in 1948; it is scheduled to be 3.7 million m^3 in 1949 and 4.0 million m^3 in 1951. No provision is made for exports.

Railway Sleepers (Ties)

According to recent estimates, there are approximately 1.25 million kilometers of railway track in the world, representing about 3,000 million sleepers (ties), 95 percent of which are made of wood. Maintenance requirements are estimated at about 5 percent annually or 15 million m^3. As sleepers rarely appear in national statistics as a separate item and information is generally scanty, it is not possible to give any accurate estimate of world output.

Output in countries reporting to FAO showed an upward trend in 1948, but figures do not include some of the most important producers, e.g., the United States and the Soviet Union. The U.S.S.R. five-year plan provides for an output of 185 million sleepers during the period 1946-50. In Europe a deficit in softwood sleepers is expected to continue, whereas the deficit in hardwood sleepers will gradually decline and probably disappear by 1951.

Railway sleepers have always been of minor importance in relation to other forest products in world trade. In 1937, they accounted for less than 2 percent of all timber exports, and in 1948 the percentage was even smaller. Since World War II, European intraregional trade in sleepers has been resumed only to a limited extent, the previous major suppliers, the Soviet Union and Poland, having been off the market until 1949. There are indications, however, of increased exports in the near future from a number of Eastern European countries.

On the other hand, shipments of sleepers from North America to Europe considerably expanded during the early postwar years, the principal countries of destination being the United Kingdom, the Netherlands, and Belgium. However, while Canada's exports increased from about 222,000 to 281,000 m^3, total exports of sleepers from the United States declined from almost 466,000 m^3 in 1947 to 234,000 m^3 in 1948. It was originally estimated that the United States could deliver 8 to 10 million sleepers out of a requirement of 50 millions for the Marshall Plan countries during the period up to 1951. The balance was expected to come primarily from Eastern Europe but perhaps to some extent from Latin America, notably Chile, Brazil, Costa Rica, Nicaragua, the Guianas, and Surinam. Later developments have increased reliance on sources outside North America.

There is a considerable body of opinion that many countries demand too rigid specifications, especially for hardwood sleepers, which means great conversion wastage and high costs of production.

Wood Pulp and Pulp Products

Wood Pulp

World output (excluding U.S.S.R.) of all grades of wood pulp amounted in 1948 to about 28 million metric tons (see Table 2). Of this quantity, some 5 million tons, or almost 18 percent, moved in international trade. From the point of view of industrial requirements, no shortage of pulp can be said to have prevailed, although consumer needs in pulp products are, in most parts of the world except the United States and Canada, largely unsatisfied.

The main pulp-producing regions are North America, which in 1948 accounted for 68 percent of world output (excluding U.S.S.R.), and Europe, which ac-

TABLE 2.—WORLD PULP BALANCE[1]

Region	1937		1948		1950 Projection	
	Consumption	Production	Consumption	Production	Requirements	Production
	Thousand metric tons					
Europe	9,900	11,590	7,000	8,050	9,400	9,600
U.S.S.R. (exports)	...	[2]145	...	40	...	75
Near East and North Africa	15	5	15	10	20	15
North America	12,030	10,950	19,255	19,010	20,290	[3]20,310
Latin America	245	25	470	190	580	315
Africa	...	...	15	15	15	15
Asia	1,525	1,180	520	505	715	665
Oceania	50	...	200	160	245	175
WORLD TOTAL	23,765	23,895	27,475	27,980	31,265	31,170

Region	Apparent Surplus (+) or Deficit (−)		
	1937	1948	1950
	Thousand metric tons		
Europe	+1,690	+1,050	+200
U.S.S.R.	+ 145	+ 40	+ 75
Near East and North Africa	− 10	− 5	− 5
North America	−1,080	− 245	[4]+ 20
Latin America	− 220	− 280	−265
Africa	...	...	...
Asia	− 345	− 15	− 50
Oceania	− 50	− 40	− 70
WORLD TOTAL	+ 130	+ 505	− 95

SOURCE: *Report of the Preparatory Conference on World Pulp Problems*, Montreal, 1949.

... None, small, or not available.

[1]The forward estimates are based on hypothetical assumptions as to prevailing economic conditions in the various countries of the world.

[2]Baltic republics.

[3]Based on maximum production estimates for the United States.

[4]It is generally expected that North America will continue to show a net import balance. The calculation on which these surplus figures are based assumes that maximum production will occur, which is not necessarily true.

counted for 27 percent of world production. The corresponding figures for 1937 were 46 percent and 49 percent.

Production in 1949 does not now seem likely to exceed the 1948 total, as was envisaged by the Montreal Pulp Conference. The 1950 projections may also not be fulfilled on account of the reduced demand in the United States and Canada in 1949. In these countries, newsprint production showed a 7-percent gain during the first six months of 1949 as compared with the corresponding period of 1948, but chemical pulp production and purchases by other paper mills declined significantly. It was clear that mills were buying only sufficient pulp to meet their immediate needs, and their pulp inventories at the end of March 1949 showed a drop of 18 percent from the same date in 1948. According to reports, the anxiety to reduce inventories seems likely to continue up to the last quarter of 1949, but unless the production of paper products begins to slacken, purchases of chemical pulp will have to be resumed early in 1950.

International trade in wood pulp consists primarily of exports from Canada, the Scandinavian countries, and Finland, plus certain quantities from the United States to Latin America and other destinations. Imports from Sweden and Finland to the United States in 1947 amounted to more than one-third of the United States wood-pulp imports, and were important dollar earners. But these imports covered only marginal requirements. As the United States pulp market became saturated in 1948, the slackening demand was followed by a downward movement of prices and a sharp reduction, almost to zero, of imports of Scandinavian pulp.

TABLE 3.—INDICES OF IMPORTED WOOD PULP PRICES (UNBLEACHED SULPHITE)

Country	1946	1947	1948	1949	
				March	June
	Base: 1938 = 100				
United Kingdom	225	318	411	404	...
United States	190	277	312	292	268

The question arises whether the reduction in prices and imports is temporary or permanent and whether, when the demand for pulp recovers in the United States, the imports from Northern Europe will be resumed. The reduction in prices will make it harder for these countries, with their comparatively high production costs, to compete in the United States market. In the case of Finland, however, the recent devaluation of the markka by 17.7 percent and the release from having to deliver pulp and paper under reparations to the U.S.S.R. is expected to restore its competitive position.

To the extent that the North European producers feel compelled to give priority to whatever they can sell for dollars or other non-European currencies, the chances of satisfying other European requirements for pulp are thereby lessened. European requirements are tending to expand more rapidly than production, although effective demand for imports is still strongly controlled by governmental restrictions on consumption. If these restrictions were eased, European demand could absorb almost the entire European production.

Pulp and paper manufacturing in Western Europe is much below capacity because of lack of raw materials. The Western European countries, including the

GEOGRAPHICAL DISTRIBUTION OF SWEDISH PULP EXPORTS
1936-38 (average), 1947, and 1948

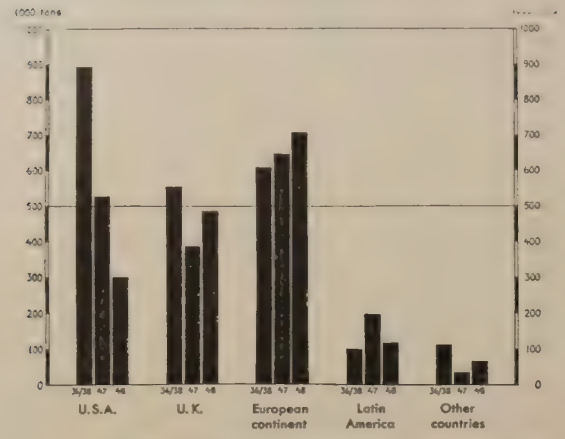


Chart by courtesy of Index, *No. 180, June 1949.*

United Kingdom, hope to regain their supplies of raw materials in order to reduce their dependence on imported paper and to expand their exports of newsprint and other paper products to underdeveloped countries. At the moment, with falling prices and a greater availability of raw materials from the Scandinavian countries, their industries are recovering. This upturn, however, may be of short duration.

The main difficulty is this question of the raw materials supply.[9] On the continent of Europe the forests of many countries have been heavily overcut during the war and postwar years. Full use of Europe's existing pulp capacity would require an increase of about 60 percent over the 1947 rate of pulpwood cuttings. This clearly could not be contemplated, nor could the wood be secured by diverting supplies from other products, such as saw timber and pitprops, since demand is high for both of these. The situation is made more acute by the lack of pulpwood exports from the U.S.S.R.

The plans of the underdeveloped countries include, in many instances, the establishment of pulp industries in order to make them independent of imports. Since it is most efficient to manufacture pulp products as part of a continuous process along with the production of pulp, there might be a corresponding shift in paper production capacity.

In Latin America and Africa the possibilities for augmenting the world pulp supply are enormous, providing that social, technical, and economic problems connected with the utilization of tropical forests can be solved. The problems of adapting tropical species to the commercial production of pulp are being explored, and a number of countries are undertaking extended research in that field. Recently France has concluded experiments on an industrial scale for the pulping of a considerable number of African species. Mixtures of as many as 24 of such species have been successfully digested in a commercial plant, and sample lots of good paper have been made from the resulting pulp. A pilot plant is under construction on the Ivory Coast to determine the practical possibilities on a commercial scale.

The use of straw, bagasse, and similar fibers as substitutes for wood in pulp manufacture has already given and may in the future give excellent results from a technical point of view. From the economic point of view their probable usefulness depends upon local conditions in each country.

Dissolving Pulp

Although so-called "dissolving wood pulp" accounts for only about 5 percent of total pulp output, the products manufactured from this commodity are of great importance. Tentative estimates for the breakdown of the consumption of dissolving wood pulp in 1948 in the United States show the following percentages:

	Percent
Viscose and acetate rayon	65
Cellophane	17
Nitrocellulose	3
Plastics	2
Special papers, vulcanized fiber, and miscellaneous	13

Not much change is expected in the immediate future in the demand for dissolving wood pulp for any field except rayon.

Over the last thirty years, the rayon yarn and staple fiber industry has developed greatly. World production of rayon and staple fiber increased between 1930 and its peak year, 1941, from 208,000 tons to over 1.25 million tons. This development was interrupted by the war, but in 1948 production reached 1.12 million tons.

It is to be assumed that, as a result of industrial rehabilitation in Germany and Japan, production in Europe and the Far East will revive substantially although it will still be small by prewar standards. There is already a large-scale diversion of sulphite capacity from paper grades to dissolving grades in the Scandinavian countries. In the United States, expansion of the rayon industry is expected to bring steadily increasing demands for dissolving wood pulp. The United States industry in 1948 used 81 percent of wood pulp in rayon manufacture as against 19 percent of cotton-linter pulp, the corresponding 1938 figures being 75 and 25 percent.

Foreign exchange shortages of major importers of natural fibers are also encouraging use of dissolving wood pulp for rayon manufacture. World consumption of rayon is expected to reach 1.4 million tons in 1949 and 1.5 million tons in 1950. So far in 1949 production of dissolving wood pulp, except in the United States, has not followed the downward production trend that has occurred in paper pulps; there have been price drops to make wood-pulp prices more competitive with cotton-linter pulp.

Fiberboards

The manufacture of fiberboards or fiber building boards offers a profitable use for low-grade portions of the forest crop and conversion "waste." The industry has expanded considerably since the war. Production in European countries rose in 1948 by about 14 percent as compared with 1947, and in North

[9] For forward estimates of pulpwood supplies see *Report of Preparatory Conference on World Pulp Problems*, Montreal, 1949.

America by nearly 17 percent. Total world production in 1948 is estimated at 2.0 million metric tons, as compared with 1.7 million metric tons in 1947.

This upward trend is expected to continue through 1949. The capacity of the Swedish fiberboard industry, which toward the end of 1948 was estimated at almost 100,000 tons of insulating board and 200,000 tons of hardboards yearly, will rise further in 1949 and 1950 on account of new industrial establishments. For the same reason, the capacity of the Finnish fiberboard industry, estimated at about 75,000 tons in 1947, is expected to reach the level of 110,000 tons a year in 1949. The third largest European fiberboard supplier, Norway, which had an annual capacity of approximately 70,000 tons in 1948, will start production shortly in two new factories. Manufacture in the Western Zones of Germany has been steadily recovering. In addition, Austria is expected to increase its production to a very great extent. In a number of other European countries the fiberboard industry has been developed to such a degree that the main part of the requirements can be met from domestic supplies, and some countries, for instance Hungary, are planning to set up new plants.

The fiberboard industry in the United States will be expanded so as to reach a larger output in 1950 than the 1.15 million tons produced in 1948. According to official estimates, production in Canada, which was 143,000 metric tons in 1948, will be over 163,000 metric tons by 1950 or 1951. Australia, which produced about 11,000 metric tons of hardboard in 1947, will probably be able to increase production up to 18,000 metric tons in 1949; softboard output is expected to remain at the present level (about 9,000 metric tons). The Union of South Africa and at least two South American countries are among the newcomers in fiberboard manufacturing.

Exports of the European producers of fiberboard also expanded during 1948, despite the fact that the change from a sellers' to a buyers' market was accentuated by the new domestic production in many countries. The demand for hardboard rose proportionately higher than the demand for insulating board.

TABLE 4.—EXPORTS OF THE MAIN FIBERBOARD SUPPLYING COUNTRIES

Country	1947	1948
	(metric tons	
Sweden	75,500	94,300
Finland	16,000	31,800
Norway	4,500	10,300
United States	43,000	33,700
Canada	47,000	41,000

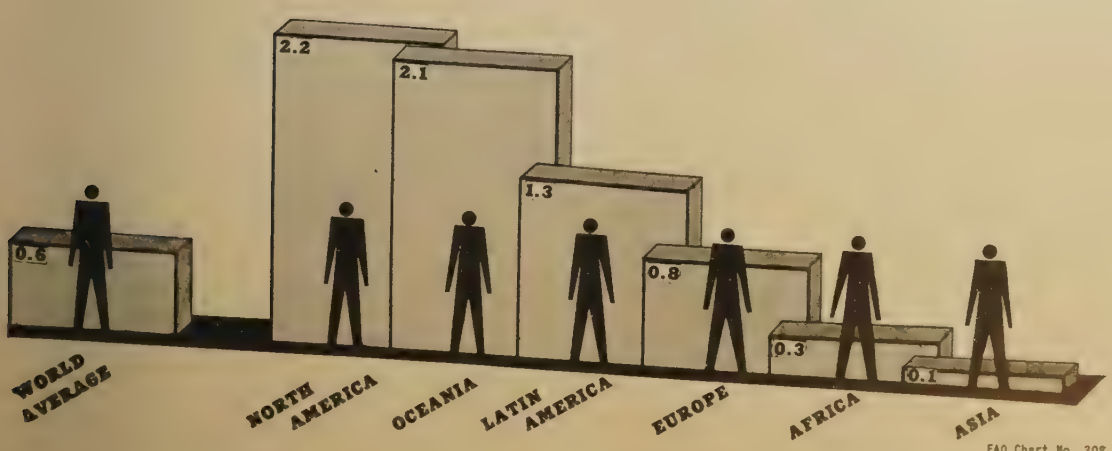
In 1948 exports from the three European countries to the United Kingdom were almost doubled, and the total U.K. purchases reached nearly 50,000 metric tons (34,000 tons in 1947). As a result of these large purchases, stocks of fiberboard in the United Kingdom at the beginning of 1949 were unusually high, the softboard stocks corresponding to two years' consumption at present rates. Imports to the Netherlands, the second largest buyer, were more than doubled in 1948 as compared with 1947.

The trend toward a geographical spread in the establishment of fiberboard manufacturing capacity may cause some of the major producing countries to cut down on their production plans. Exporting countries are already looking for new markets, which should be available in some subtropical and tropical regions.

WOOD AND WOOD PRODUCTS

RELATIVE LEVELS OF CONSUMPTION, 1948*

Cubic meters per person



FAO Chart No. 308

*Based on reported data only.

Fourth Meeting of the Technical Committee on Wood Chemistry

THE Fourth Meeting of the Technical Committee on Wood Chemistry was held in Brussels from 25 to 27 August 1949, under the auspices of the Belgian National FAO Committee. Dr. H. Mark, Director of the Institute of High Polymer Chemistry and of the Chemical Department of the Brooklyn Polytechnic Institute, New York, was chairman, and members from 13 countries participated. Countries represented were: Argentina, Australia, Austria, Belgium, Canada, Finland, France, Italy, the Netherlands, Norway, Switzerland, the United Kingdom, and the United States of America.

At the opening of the meeting, Mr. Glesinger of the FAO Forestry and Forest Products Division stressed the necessity for making practical application now of the hitherto mostly theoretical work of the Committee. He said that in many instances governments were seeking technical advice from the Division, and important banking organizations were consulting the Division about specific investment projects involving forestry and forest industries. Such cases are referred to the Division's committees of experts. The United Nations Technical Assistance Program has further enlarged the scope of work with which these committees should deal.

The following agenda was adopted: (1) Integrated wood utilization; (2) Pulping of tropical wood species and other materials; (3) Progress in cellulose chemistry; and (4) Progress in lignin chemistry.

After the business session of the first day's meeting, the Belgian FAO Committee organized a visit to the Chemical Laboratory and the Museum of the Belgian Congo, followed by a reception given by the Director of the Museum. A number of delegates participated in an excursion to the Ardennes forests and visited the pulp and paper factories in Duffel, near Antwerp.

Integrated Wood Utilization

Papers were presented on the following subjects: "Integrated Wood-using Industries in Australia and New Zealand" by W. E. Cohen, "Development of Integrated Forest Utilization in the United States" by J. A. Hall, "The State of Integrated Forest Utilization in Canada" by J. H. Jenkins, "The Economics of Forestry Combinates on a Small Scale" by J. A. von Monroy, "The Future of the Pyrolysis of Wood (Wood Carbonization)" by J. Gillet, "The Progress of the Saccharification of Wood and Alcohol-Production from Wood or its By-products" by A. Villière. As a result of the discussion of these papers, the following conclusions were drawn by the Committee:

Conclusion 1

(a) The Committee recognizes and wishes to call attention to the fact that integrated forest utilization on an industrial scale is making rapid progress in several regions of the world and is believed to be a dominant trend in the development of forest industries. Since, although varying in size and in composition, "integrated utilization" is now in successful operation or being developed in the Scandinavian countries, Central Europe, North America, and Australia and New Zealand, its technical and economical feasibility for most forest types is made clear.

(b) The composition of integrated utilization units and their size depend on a variety of economic, social, physical, and market conditions. As a result there exists no single combination of units that is universally applicable. On the other hand, it is noted that integrated utilization in the Scandinavian countries and North America has frequently and successfully served as a model for the installation of similar plants in other parts of the world.

(c) The Committee recommends that attention be called to the many examples of the successful integration of wood-using industries developed under favorable conditions and having as their objects more complete utilization and more efficient forestry practice.

(d) In order to promote the fullest consideration of the possibilities of integrated utilization in present and future operations, the Committee invites FAO to collect, with the assistance of Committee members and special experts and through other proper channels, the most complete data possible on the technical and economic results of integrated utilization from all countries where such operations have been installed. FAO is requested to circulate its findings and any additional comment among Committee members as early as possible in order to facilitate review and discussion at the next meeting of the Committee.

(e) The discussions at the present session have brought out the current trend toward the combination of at least two types of industry, one based on mechanical conversion (sawmills, plywood, etc.), the other designed to use primarily wood as a source of fibers (pulp and paper, various types of wallboards, etc.). Such integration has been demonstrated to be technically desirable and feasible under a wide range of conditions. Other elements of integrated utilization are: wood hydrolysis, destructive distillation, recovery of alcohol and lignin products from waste liquors, and utilization of resin and bark. All of these have found commercial application. Although the latter processes can contribute substantially to raising the over-all yields from integrated operations, they do not lend themselves to the same general application as the two types first mentioned.

(f) Further technical and economic research is recommended to determine and improve conditions for the industrial application of all phases of utilization, as well as to establish the technical solutions needed to raise further the over all yields and financial returns from "integrated operations."

Pulping of Tropical Wood Species and Other Materials

The following papers were presented: "The Utilization of Tropical Forests for the Production of Pulp and Paper" by P. le Cacheux and R. Peteri, "Some Factors Affecting the Assessment of Pulpwood Quality" by W. E. Cohen, "Studies Concerning the Influence of Certain Anatomical and Physical Properties of Wood Species on Pulp Qualities" by A. Villière, "Cellulose from Annual Crops, Especially from Cornstalks" by A. Küng, "Cellulose Production from *Eucalyptus saligna* by the Sulfate Process" by F. Hohngren, F. Vay, J. Ruby, and H. Capo, "Study of *Cana picanilla* as Raw Material for Paper Pulp" by J. J. Patteta, J. Ruby, and H. Capo, "Argentine Forestry Problems" by L. Tortorelli, "Nitration as a Tool in the Study of Wood Pulping Processes" by O. Bryde, "Use of Subtropical Brazilian Woods for the Cellulose Industry" by H. Rys. The conclusion drawn from the discussion of these papers is given below.

Conclusion 2

Subtropical and tropical wood species can be successfully pulped by standard alkaline cooking methods with only minor modifications. When pure stands are not available, cooking conditions can be selected for the pulping of mixed species although, in general, under these circumstances the optimum yields and properties for each species may not be obtained. It is, however, claimed that in certain cases the cooking of mixtures can even improve the average yield and quality of the pulp.

Progress in Cellulose Chemistry

Dr. Mark, chairman of the meeting, pointed out that two problems are now being most intensively studied: (a) possible weak spots in glucose, and (b) the reason for the important differences in the reactivity of celluloses showing identi-

cal analytical standard figures. He said that the answer is most probably to be found in the studies of the degree of lateral order and crystallization.

Next, Dr. Mark showed a series of new slides on the application of the electronic microscope and shadow-casting to wood studies which may eventually add the realm of fibrils (500-2000 A) to our direct and visually attainable knowledge. The photos showed parts of primary cells of hardwood and spruce; secondary cell-walls in the natural state, after mild hydrolysis, and after ordinary cooking; and a bacterial cellulose.

Prof. Ant-Wuorinen spoke on "The Existence of Carboxylic Groups in Cellulose Materials," explaining that native, unoxydized samples, pretreated by his method of washing with a simultaneous stream of pure nitrogen, do not exhibit any acidic character.

Prof. G. Centola in his report on "Characteristics of Pulps for the Production of Rayon" discussed his new method of filtrability, showing the relations between the macromolecular structure of various pulps and the filtrability of viscose solutions made from them.

Mr. W. E. Cohen reported on "Acid-sensitive Links in Eucalypt Cellulose" and on the chain-length distribution in nitrated carbohydrates of these woods, providing evidence to support the theory of Schulz and Flusemann that naturally occurring celluloses contain a periodic link susceptible to acid hydrolysis.

Progress in Lignin Chemistry

In "Some Remarks Concerning the Contents of Lignin in the Woods of the Congo," Prof. A. Castagne described his methods of sampling as well as his analytical procedures. His conclusions, as well as the ensuing discussions, showed the great difficulties in this field and the necessity to choose different methods of lignin determination according to the whole chemical composition of each species, eventually adding more specific analytical determinations.

On account of the urgency of this matter the Chairman was authorized to further the respective research work in conjunction with the Subcommittees for Standards and Nomenclature of FAO's Wood Chemistry Committee as well as with those of the Technical Association of the Pulp and Paper Industry (TAPPI) and the American Chemical Society, in order to present a report on this question at the next meeting. Further a Subcommittee for Lignin-Determination was constituted under the chairmanship of Mr. W. E. Cohen, who presented a paper on investigation of eucalypt lignin by means of a methanol cooking procedure, isolating a buff-colored powder which retains all the reactions of lignin *in situ*.

Prof. von Wacek reported on "New Contributions to the Chemistry of Lignin." He said that as lignin is recognized as a condensate of partly oxydized and partly only mettrylated phenylpropane units, there remains open one important question: what is the exact distribution of the oxygen in the side-chains of natural lignin?

Discussion of the reports resulted in the following conclusion:

Conclusion 3

The Committee has heard eight reports on recent progress in the chemistry of cellulose and lignin, bringing to light the rapid development in this field. It draws the attention of FAO to the fact that some of these new developments will soon enter the stage of practical application. The Committee will put on the agenda of its annual meeting in 1950 a comprehensive report on practical application of recent scientific results.

The Committee further suggested the following agenda for its next meeting:

Part I—Scientific Progress in

1. Cellulose chemistry
2. Lignin chemistry
3. Resin chemistry

Part II—Industrial Development

1. Integrated wood utilization

(Progress report on the latest developments to be prepared by FAO in conjunction with the Committee members. See Conclusion 1, paragraph d.)

2. Progress in the pulping of
   (a) tropical woods,
   (b) temperate hardwoods.
3. Chemical utilization of other cellulose materials.

Part III—International Co-operation

(Progress reports to be presented by the secretariat.)

To further international co-operation in the field of wood chemistry, the Committee offered assistance from its members to the FAO secretariat in the preparation of the following:

1. An English-French glossary of terms relating to wood chemistry
2. International standards for paper-testing methods
3. A list of scientific institutes and laboratories in the field of wood chemistry

Upon request of Committee members, the FAO secretariat will endeavor to collect information on scientific work undertaken or planned in various countries with regard to specified subjects.

Conference on Mechanical Wood Technology

FAO's first World Conference on Mechanical Wood Technology was held at Geneva from 29 August to 3 September 1949 and was attended by 34 delegates representing 20 countries: Argentina, Australia, Austria, Belgium, Canada, Czechoslovakia, Dominican Republic, Finland, France, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Sweden, Switzerland, Thailand, the United Kingdom, and the United States of America.

An address of welcome was delivered by Mr. Leloup, Director of the Division of Forestry and Forest Products, acting as the representative of FAO's Director General. He pointed out that the alleviation of the world shortage of wood, which would become more pressing as FAO came nearer to attaining its objective of raising the standard of living of all peoples, is possible by means of: (a) improved forest management; (b) utilization of unexploited forests and afforestation of denuded areas; and (c) reduction of waste. He emphasized the fact that a very thorough knowledge of the mechanical properties of wood is required to put to use unexploited forests and to better utilize wood and its by-products. A notable advance toward these objectives would be standardization of all wood-testing on an international scale, he said, so that information and data could become readily exchangeable and wood could be classified in generally accepted, well-defined categories. As the first step, one of the main tasks of the Conference would be the discussion of an international agreement on the mechanical testing of wood.

The Conference then adopted the following agenda: (1) Mechanical testing of wood; (2) Preparation of recommendations for the international standardization of mechanical testing of wood; (3) Physical and mechanical testing of fiberboards, plywood, and modified wood; (4) Standard grading of timber; (5) The role of FAO's Committee on Mechanical Wood Technology in the United Nations Technical Assistance Program.

Mr. J. G. Campredon, Director of the National Timber Institute of France, was elected Chairman, with Mr. B. H. Thunell, Technical Director of the Timber Research Laboratory, Stockholm, and Mr. J. L. Bienfait, Director of the Forest Products Research Institute, Delft, the Netherlands, as Vice-Chairmen.

The recommendations of the Conference were drafted by a committee consisting of Mr. L. J. Markwardt, Assistant Director of the Forest Products Laboratory, Madison, Wisconsin (U.S.A.), as rapporteur, and the following members: Mr. J. L. Bienfait, Mr. J. A. Collardet, Mr. H. Kühne, and Mr. J. Latham.

Mechanical Testing of Wood

First, consideration was given to the work carried out in the past by FAO's Committee on Mechanical Wood Technology, and its recommendations on the mechanical testing of wood were unanimously adopted.

After having examined and discussed a number of progress reports and proposals on the standardization of wood testing presented by Mr. Cooper (Australia), Mr. Markwardt (U. S. A.), Mr. Bienfait (Netherlands), Mr. Kühne (Switzerland), and Mr. Siimes (Finland), the Confer-

ence reached complete agreement on a number of methods of wood testing, thus laying the groundwork for an eventual international convention for the standardization of all testing methods. The Conference recommended that special efforts be made to facilitate the continuous dissemination and exchange of information and data on standardization on an international basis.

The specific points on which the Conference reached agreement and adopted recommendations were: 1. General conditions of testing wood, relating particularly to basic tests of small clear specimens for evaluating the properties of wood; 2. Compression test parallel to grain; 3. Static bending test; 4. Tension parallel to grain; and 5. Impact bending.

Progress was reported on the special studies of shear testing methods and tension perpendicular to grain, compression perpendicular to grain, cleavage, and hardness. The Conference recommended that these studies be continued and completed and that recommendations be prepared for consideration by the next Conference. As to the standardization of an abrasion test, since there is a notable difference in the usability of the machines under review it was recommended that further studies be undertaken and that possible new developments be included.

In order to carry forward still further the work of the Conference on methods of testing and interpretation of data, other special studies were assigned on moisture-strength relations and on cleavage and tension perpendicular to grain. Reports on the first subject will be presented at the next Conference by Mr. Travnik (Czechoslovakia), and on the latter by Messrs. Bienfait, Cooper, Kühne, and Markwardt.

Testing of fiberboards, plywood, and related materials

Mr. Markwardt presented a very detailed report on methods for testing fiberboards. He referred to valuable contributions from Sweden, Great Britain, Germany, France, and Austria. The Conference found it necessary to continue these studies in view of the complexity of the subject and of the necessity for establishing methods for some additional tests, such as impact resistance. The Conference therefore designated a study committee consisting of Messrs. Markwardt, Brauns, Collardet, Jenkins, and Latham, with special instructions to determine the scope of application of the methods with respect to types of material, the kind of tests to be standardized, and the procedures to be used for each with respect to sampling and method of test. On the basis of discussions and a report by Mr. Siimes on veneer, plywood, and related materials, the Conference appointed a study committee consisting of Messrs. Latham, Collardet, Wright, Jenkins, Markwardt, and Thunell. Their task is to prepare for the next meeting a draft standard scheme, taking into account methods in all countries, including aircraft and navy specifications, and to consider the possible establishment of a list of definitions and terms relating to veneer, plywood, and related materials.

Standard Timber Grading

The Conference recognized the great difficulties encountered in the attempt to standardize commercial grades and sizes of sawn timber because of well-established trade rules in many countries and differences in growth structure and characteristics among the various species. The Conference came to the conclusion, however, that substantial progress could be made in summarizing the basic principles of structural grading essential to economical and efficient engineering use of timber. It recommended, therefore, that a study be made of the definition of terms and that, as far as possible, uniform principles of structural gradings that could be generally applied to all species be established. The Conference appointed a special study committee to carry forward this program. Members are Messrs. Siimes, Campredon, Dahlquist, Jenkins, Kühne, Latham, Markwardt, and Travnik.

Nomenclature

In treating the problem of nomenclature of commercial woods, the Conference came to the conclusion that it should be possible to reach a certain degree of generalization and simplification in recommending the exclusive use of one or more commercial designations to identify each species. It therefore entrusted the Forest Products Branch of FAO's Division of Forestry and Forest Products with the task of compiling and reconciling the official and already established nomenclatures developed by competent organizations in a number of countries, and to prepare a list of designations which could usefully be generalized.

The nomenclature to be established should give, besides the designations recommended, the botanical names, the average specific gravity, preferably at 12% moisture content, and all other information necessary to facilitate the choice of eventual uses.

The Role of FAO in the Technical Assistance Program

Mr. Glesinger of FAO pointed out that in contributing to the United Nations Program of Technical Assistance to underdeveloped countries, by giving practical advice to member governments on specific points, FAO would have to rely on expert bodies, such as the present Conference, for help and for the selection of technicians for specific missions. It was suggested that the Conference should authorize the Chairman to maintain continuous relations with FAO, in order to advise it on technical matters, and with the delegates of the Conference, in order that their help might be enlisted when any problems arose in connection with the Program of Technical Assistance on which they were particularly qualified to deal. This suggestion was unanimously approved.

Adoption of Resolutions

After unanimous adoption of the resolutions presented by Mr. Markwardt as Rapporteur of the drafting committee, the Chairman laid particular stress on the progress achieved by the Conference towards an international standardization of timber testing. He noted that agreement was reached on many points where previous attempts over the last two decades had failed, thereby providing the basis for an international convention on mechanical wood testing, a draft of which is to be prepared by FAO for consideration at the next Conference.

Technical Committee on Forestry Education

AS MANY specialists on forestry education were present at the Third World Forestry Congress in Helsinki, Professor Champion (United Kingdom), Chairman of the Technical Committee on Forestry Education, called a meeting together on 16 July at the "Forest House" of the University of Helsinki.

Professors Dwight (Canada), Oudin and Rol (France), Ranganathan (India), Houtzagers (Netherlands), Vahid (Pakistan), Streyffert (Sweden), Leibundgut (Switzerland), Saatcioglu (Turkey), Garratt and Shirley (United States) attended. Mr. François of FAO acted as secretary to the meeting.

After a short report by the secretary on the work being done by FAO's Division of Forestry and Forest Products to assemble and supply information for governments, institutions, and private persons in this field, the Chairman outlined the object of the meeting: Since a great many countries are at present making efforts to begin forestry education or to create forestry schools, it would appear very useful to lay down minimum requirements for such training and schools, in order to ensure an adequate supply of trained foresters and forest officers to carry out the tasks governments or private organizations may assign to them. The meeting achieved a remarkable unity of views on the problem, and its recommendations will be most useful for FAO's work in this field.

European Forestry and Forest Products Commission

THE second session of the European Forestry and Forest Products Commission was held at Geneva from 5 to 10 September, 26 delegates from 15 countries being present. Countries represented were: Austria, Belgium, Czechoslovakia, Denmark, Finland, France, Germany (Bizone and French Zone), Ireland, Italy, the Netherlands, Norway, Portugal, Sweden, Switzerland, and the United Kingdom. Yugoslavia and the International Labour Organisation sent observers. Mr. Owen J. Sangar, Director of Forestry, England (United Kingdom), was elected Chairman of the meeting and Mr. Eino Saari, Professor of Forest Economics, University of Helsinki (Finland), Vice-Chairman.

Leading forestry authorities of Europe conducted a series of discussions designed to produce better co-ordination of the forest policies of their countries on an over-all European basis and to improve timber resources and forestry practices. Reports were read of advances made in some countries, and special attention was given to the technical requirements necessary for increasing the productivity of European forests.

The extent of the disastrous forest fires that recently ravaged the Landes district of France was described, and the Commission agreed that member countries should provide all possible assistance in helping France to restore its forest economy. In particular, the possibility of purchases of fire-killed timber, which must be used at once, will be urged by Commission members on returning to their countries.

The Commission approved a program of study designed to improve the quality of new forests by the introduction of superior strains of trees. To attain that objective, the Commission contemplates the introduction of internationally sanctioned certificates attesting that the seed is collected from satisfactory parent trees.

The Commission also approved the report of its subcommission on Mediterranean problems, including the proposed setting up of demonstration areas for the rehabilitation of damaged soils which are so common in the Mediterranean region. In these areas a balancing of the requirements of forestry, agriculture, and pasturage would indicate those land-use programs best adapted to the interests of other local communities.

In preparation for its next session the Commission adopted a list of subjects to which close study would be directed during the ensuing months. It urged member governments to assist by providing details of their own problems and of advances made in solving them. Among the subjects chosen for special consideration were reforestation, control of insect infestations, mechanization of logging operations, and the training of workers.

The Commission spent a day in the commune of Bassins on a field trip arranged by Swiss federal, cantonal, and communal authorities. Members were able to observe at first hand the successful co-ordination of all land uses, including forestry, agriculture, and pasturage, to the benefit of the entire community.

A full report of the session is available on application to FAO.

News of the World

The items appearing here are condensed selections of news thought to be of interest to readers of UNASYLVA. *They are grouped alphabtically by countries under headings currently used by the Division of Forestry and Forest Products for reference purposes. The Editor will be glad to receive direct from readers authenticated items of interest and of news value for this part of the review.*

General

BERMUDA

• Many of the Bermuda cedars (*Juniperus bermudiana*) are being destroyed by the juniper scale. All efforts at control of the scale, the presence of which was first discovered in August 1945, have been unsuccessful. Actual count in some sections discloses that more than 60 percent of the trees are dead, and there is every indication that the mortality will increase. Realizing the need to restore the natural beauty of the colony, which is an important tourist attraction, the Bermuda House of Assembly has voted funds to be used by the Bermuda Department of Agriculture in starting the work of reforestation. It is understood that additional funds will be granted when needed. The initial funds will be used to purchase machines for uprooting and removing the dead trees. Seedlings, preferably of some species not likely to be attacked by the scale, will then be planted. The entire project is expected to take several years. As much timber as possible will be salvaged, but the Bermuda Government has indicated that none will be exported. A steady demand for seasoned wood exists in Bermuda, and trees suitable for lumber will be milled into appropriate dimensions by portable sawmills and stored for future use.

UNITED STATES OF AMERICA

• As a profitable market for fuelwood is one of the greatest needs in forestry, a small bulletin (No. 28) recently issued by the Northeastern Wood Utilization Council will be found very useful. This bulletin, entitled *How to Burn Wood*, considers the following aspects of the subject: comparative fuel values; wood distillation methods; wood heaters, fireplaces, stoves and furnaces; sawdust burners; chipped wood as fuel; sawdust briquettes, charcoal, use of wood ashes; producing fuelwood; and improved woods tools.

UNION OF SOVIET SOCIALIST REPUBLICS

• For the first time on record an oratorio in praise of forestry has been written. Dmitri Shostakovitch, one of the greatest living composers, has set to music a poem, "Song of the Forests," by the Soviet poet Evgenia Dolmatovsky, celebrating the project for the creation of forests and shelter belts across the Soviet Union's richest farming areas (see UNASYLVA, III, 2, p. 55). The oratorio is written for choir, soloists, and orchestra.

• The Siberian cedar (*Pinus siberica*) is valuable both for its wood and for the nutritious nuts that it bears. Actually it is not a cedar but a five-needle pine, similar to the white pines (*P. strobus* and

P. monticola) of eastern and western North America. It grows for the most part on the plains of central and northern Siberia; only small stands are found in the mountains of the South. There are close to 7,000,000 hectares of exploitable cedar forests in the provinces of Tumen, Tomsk, Novo-Sibirsk, Attai, Kemerov, Krasnoyarsk, Irkutsk, the Buryat–Mongolian Republic, and Chita, not including the cedar stands of the Yakut Republic and many areas of young merchantable stands and areas of low productivity. The largest areas of merchantable cedar forests are in the provinces of Tomsk (2,400,000 ha.), Krasnoyarsk (1,220,000 ha.), and Irkutsk (1,150,000 ha.). About 87 percent of the cedar is mature and overmature, and offers opportunities for the development of large timber operations. The wood is of high quality, suitable for making pencils, veneer, furniture, packing boxes, lumber, structural timber, and other industrial products. Until 1923, when the Siberian Timber Trust was created, there was little cutting except for local use. In 1911-13 some cedar cut in the Altai was exported abroad for use by the pencil industry. In 1914, 10,000 cedar logs were cut in the basin of the river Yenisei for export by the Northern Sea route, but they were never exported. The Siberian Timber Trust is now carrying on fairly extensive logging operations in the cedar forests of the Tomsk province and also in the Altai and south of Krasnoyarsk, chiefly for pencil wood.

In developing the cedar timber industry, the Siberian Timber Trust is faced with the problem of developing nut production at the same time. The nuts are richer in oil than hemp, flax, sunflower, and many other oleaginous seeds. Long before cedar was cut for logs the cedar nut (similar to the piñon nut of the southwestern United States) was extensively consumed throughout Russia and provided a substantial income to the local population. Every third year is considered a good seed year; every second year produces a crop; and some seed can be harvested every year. The quantity of nuts produced depends upon the vigor of growth and the age of the stand and upon the geographic location. It ranges for an average seed year from 16 to 68 kilograms per hectare. Considering the large area of good cedar forests, the possibilities for developing a large nut industry exist. The present harvest is insignificant. In the Altai region, for instance, the quantity of nuts collected does not exceed 5,000 tons; in the southern part of the Krasnoyarsk region it is only 3,000 tons—a mere fraction of the possibilities. The problem which faces the Siberian Timber Trust is to reconcile an increase in logging with an expanding nut production. The best timber trees are also the best nut bearers. Some form of selective cutting, therefore, is clearly indicated. As early as 1939 the Government issued instructions to divide all cedar forests into two categories, nut-producing and timber-producing; implementation, however, has met with difficulties, and in the meantime logging is going on in the most accessible localities. If trees that are valuable as nut bearers are not exempted, there will not be enough left to ensure continuous and abundant crops of nuts.

Fundamental Science

Czechoslovakia

• That the absence in the soil of some minor chemical elements can hamper the growth of forest stands has been proved by two experiments with borax and copper. 1. A Norway spruce plantation on a degraded sandy podsol with hardpan was not doing well. It seemed to suffer from some nutritional deficiency. In 1934 the heather ground cover was removed, the soil was loosened, and copper slag (1.62% CuO) was applied at a rate of 12 kilograms per 100 square meters. In 1946 the heights of the stands on the treated and untreated plots were respectively 116.8 and 94.4 centimeters; the foliage of the former was green and that of the latter yellow-green. 2. In 1940 a deep, clayey nursery soil, somewhat acid and poor in nitrogen (N), potassium (K), and phosphorus (P), was treated with ground limestone alone (2 kg. per 5 $m.^2$) and limestone together with borax (2.87 g. per 5 $m.^2$). The soil thus treated was planted to one-year seedlings of Norway spruce. Both treatments improved development and foliage color of the transplants, the combined limestone and borax treatment giving the better results. In 1943 the fresh weight of the shoots and roots of the treated transplants was considerably greater than that of the untreated.

Poland

• A survey of about 14,000 hectares of forest in Poland has shown a definite correlation between the site quality of pine stands and the proportion of particles smaller than 0.25 millimeters contained in the soil. Sandy soils having a uniform water table lower than 2 meters and a proportion of small particles above 40 percent can be expected to support first-quality pine. This criterion was found applicable also over large areas in estimating the quality of the soil in the case of oak and silver fir. Although the proportion of small particles is not the only factor on which the height of the stand depends, it is considered a sufficiently reliable criterion of quality for management purposes. This method, however, is not suitable for determining the quality of soils which are less uniform, which have a high water table or much humus, or which show great variations in the proportion of particles smaller than 0.25 millimeters.

Union of Soviet Socialist Republics

• In agriculture, it has long been known that crop yields are increased by applying small doses of antiseptics such as chlorpicrin, chlorine, carbon disulphide, formalin, and hydrochloric acid, even to uninfected soils. These substances stimulate useful soil microorganisms, increase availability of nutrients, and improve the chemical properties of the soil. In forestry, the high cost of fertilizers restricts their use to nurseries and plantations on comparatively small areas. The only practical measures for improving the soil on large tracts of natural forests are the scattering of slash, without burning, on poor sites and slash-burning on the better ones.

The use of chlorates has been tried in forest nurseries, plantations, and cleared areas, as well as under canopy, in northwestern and southeastern European Russia with the following results:

1. After the toxic chlorate residues had leached out of the soil, planted or natural seedlings of various species showed marked improvement: they had better root system and height growth, more branches, larger leaves, and greater air-dry weight as compared with controls. Deciduous species reacted most strongly. The height growth of oak, ash, elm, maple, and Siberian pea tree (*Caragana arborescens*) more than doubled: the total air-dry weight and the size of the leaves increased even more. Turning of the leaves in the fall began later in the treated plantations, and during the summer drought the leaves remained a healthy green while those on untreated areas turned yellow.

2. Coniferous species, especially pine, reacted less vigorously, but even for pine the chlorate treatment increased height growth by 50 percent and doubled air-dry weight.

3. Mixed spruce and broadleaved plots treated with chlorates at 3 to 5 grams per square meter showed several times as much natural spruce regeneration as the control plots. During the five or six years of observation, these seedlings grew three to four times as fast as the controls, and had longer and darker green needles.

4. Application of small doses (1-3 gm/m^2) several days before sowing or planting, or just after sowing, resulted in better growth during the first two years. The effect of larger doses was observed to last for several years.

5. Doses of 1 to 2 grams of chlorate per square meter of soil caused no injury to trees or shrubs over two or three years old, provided that the solution did not touch the aerial portions of the plants.

6. The effect of the chlorates is indirect. They hasten decomposition of plant residues, increase microbiological activity, and promote ammonification and nitrification, particularly the latter, the nitrates being the best source of nitrogen for plants.

7. The use of small amounts of chlorate in solution as a spray proved effective in controlling herbaceous vegetation and young root suckers of trees. A spring spraying of weeds in a nursery with 1 to 3 grams of chlorate solution per square meter several days before sowing or transplanting is estimated to save from thirty to fifty man-days of weeding per hectare during the season. A stronger solution of 5 grams per square meter used in the forest destroyed root suckers of aspen and alder. A solution of 3 to 5 grams per square meter is sufficient to destroy *Vaccinium myrtillus* and ensure its absence for several years. Where perennial herbaceous weeds are present, however, small doses may stimulate their growth instead of killing them.

8. Since potassium chlorate is expensive, the most suitable chlorate for these purposes is probably calcium chlorate.

• To prevent the scattering of research efforts and avoid duplication, the Ministry of Timber and Pulp Industry has designated the Central Scientific Research

Institute of Mechanization and Energetics of the Timber Industry as the main planning organization for all research in the field of mechanization, organization, and economics of lumbering. It is to co-ordinate the work of all research institutions and outline the problems upon which each research unit is to work. Other institutions are the Siberian Scientific Research Institute of Forest Management and Forest Exploitation, the scientific research sectors of the Leningrad Technological Forestry Academy, and several other technical forestry schools of university standing.

Silviculture and Management

Belgium

• There is considerable interest in many countries in hybrid larches, some of which provide remarkable examples of heterosis. The Director of the Forestry Research Station of Groenendaal recently published the result of studies on the best known of these hybrids, *Larix eurolepis*, resulting from the cross pollination of *L. kaempferi* by *L. decidua*. This spontaneous-growth hybrid was first noticed in Scotland at Dunkeld (Perthshire) in 1885. Belgium has plantations of it, one of which was established in 1910 before the hybrid had even received its official name. Its rapid growth is noteworthy. In Scotland, it sometimes grows to a height of 80 to 100 centimeters in the first three years and to a height of 16 meters at 16 years of age. In Belgium, the best-known examples reached a height of 12.50 to 15 meters at the age of 21 years and a circumference of from 72 to 96 centimeters at 1.50 meters from the ground. Unfortunately, the study of this hybrid presents great difficulties because of the instability of its characteristics, beginning with the first (F_1) generation; so marked is this instability that the hypothesis has been advanced that a segregation of the hybrid occurs beginning with the first generation, with a return in part to the parental types. The study of these characteristics is also complicated by the fact that some of the seedlings are greatly affected by soils and by environment and site conditions, particularly with respect to their wood texture. Finally, a differentiation between seedlings of the same age occurs as these grow older, bringing forth certain characteristics which were not in evidence when they were young. One-year-old seedlings of both the first (F_1) and the second (F_2) generations are practically identical, but they begin to differ at the age of two or three years. However, in Belgium at least, the trees of the first generation are of the *kaempferi* type. Consequently it may be that the apparently dominant *kaempferi* characteristics are only temporarily masked in some of the trees. The trees of the *L. decidua* type of the first generation appear to be somewhat superior to the others. These studies will have to be continued, particularly with a view to accurate identification of the Belgian stands of so-called Japanese larch. This could be done: (a) by checking the seedlings issued from seed harvested from Japanese larch planted close to European larches and also from recognized hybrid larches; (b) by intensified production of hybrids through the creation of seed tree stands, or larch "orchards"; and (c) finally, by employing grafting methods, already widely utilized in Denmark.

France

• The Forest Biology Department of L'Institut du Pin in France recently announced the success of experiments initiated some time ago on the propagation of *Pinus pinaster* by cuttings. Although in America propagation by cuttings of the longleaf pine (*Pinus palustris*) had failed to achieve the desired results, research workers of the *Institut* observed that in no case were scar excrescences formed at the cut end of the branches after they had been placed in the earth. Consequently, they tried to obtain the formation of such an excrescence before severing the shoots, by making a ring-shaped cut from one to three centimeters in width in the bark at the base of one-year old shoots, cutting away the outer and inner bark tissues. The unbarked ring was then spread with a lanolin-base paste containing indol-acetic acid, and covered with a piece of cloth bound with raffia. Towards the end of the growing season, shoots which had been treated in this manner, and on which a large scar excrescence had appeared, were much larger in diameter at the end than below the ringed cut. They were severed at the place where the ringed cut had been made and heeled-in in wet sand, which was watered regularly every 40 minutes and maintained at a temperature of 12° C. during the night and 15° to 25° C. during the day. Throughout the night they were kept under artificial light from sun-ray lamps. The following spring, some of the cuttings had one or two roots, varying in length from a few millimeters to 22 centimeters, and of comparatively greater thickness than the roots of young saplings of the same age. The following autumn, one slip already had secondary roots near the ring cut where the excrescence had appeared.

Indonesia

• Only in recent years has it seemed important to improve forest trees by the genetic methods effective in agriculture. In view of the work in forest genetics accomplished in Europe and the United States of America (covering climatic races, influence of the mother-tree on its offspring, hybrids, mutations, vegetative propagation, and growth substances), and the need for forest genetics work in Indonesia, discussions are now under way concerning the addition of a new branch to the Forestry Research Institute at Buitenzorg and the most productive lines of initial research in this field.

Lebanon

• Lebanon is making a determined effort to preserve its few remaining cedar trees, once famous as a building material. Once the mountain ranges of Lebanon were covered with the great, spreading trees. Now these slopes, gradually denuded with the passing of centuries, are nearly bare. Only a few groves remain. To protect them, Lebanon has forbidden further cutting without special government permission, and the person who cuts down one tree must plant fifty trees. A twenty-year reforestation program, to begin next fall, includes plans to set out thousands of young cedars on the cool slopes, where they grow best.

Transjordan

• Transjordan has initiated a forestry program as a result of a study made by one of its officials in Cyprus. King Abdullah is patron of a newly established Arbor Day. Two tree nurseries have been started, and a soil conservation program has begun. Demonstration plots planted near the main highways call attention to the efforts being made to combat erosion.

Union of Soviet Socialist Republics

• The Zoological Laboratory of the All Union Institute for Plant Protection has developed a new zoocide for the protection of tree seed against rodents. It contains two active ingredients: phosphide of zinc (the poison) and ammonium chloride (a repelling substance). It is prepared by making a thin paste of flour and water, adding ammonium chloride (250 gm. to 1 liter of the heated paste), and stirring the mixture until the ammonium chloride is fully dissolved. This mixture is poured over the seed and allowed to thicken. Then a powder of phosphide of zinc and fine chalk (in equal parts by volume) is sprinkled over the seed until they are uniformly covered by it. After that the seeds are spread out to dry. The chalk is used to prevent the phospide of zinc from decomposing in the soil, and the flour paste serves as a binder. Tests have shown that the coating remains intact on the seed in moist soil for a month and more. The tests have also shown that the coating does not lower or even delay germination. As a matter of fact, in a number of cases the application of the zoocide acts as a fertilizer at the early stages of the development of the seedlings. The treated seed produced better developed seedlings than the untreated. The zoocide is poisonous to man and animals and should therefore be handled with proper precautions.

• To expedite the big forest-planting project now under way, the Soviet Union is mass-producing a standard planting machine, known as the PC-2. The machine is claimed to be extremely efficient and of a design so simple that no difficulties will be experienced with repairs. It plants either cuttings or seedlings. A number of the machines can be used coupled together and pulled by a large caterpillar tractor. Another more complicated machine, called the PN-5, is designed for setting out seedlings.

From tests recently made of several cultivators, the tractor known as KLTC-6 was judged the most successful for the cultivation of newly planted trees. Another special tractor is in production that is designed to move between rows without damaging the tops of young trees, while the tractor "STZ-NATI" has an attachment for digging planting holes.

• A new method of establishing protective strips around cultivated fields is being advocated, the so-called "nest" planting. Instead of setting out nursery-grown seedlings in rows, which is the usual way, the seeds of the trees that are to make up the bulk of the forest strips are sown at the same time as the seed of the agricultural crops, and not in rows but in small clumps or "nests." The

principal species of the forest strips on the heavier soils is oak; on the lighter sandy soils, pine.

This is the procedure that is followed: On a field thoroughly prepared for sowing agricultural crops, the strip set aside to grow trees is marked by longitudinal lines 5 meters apart and by crosslines 3 meters apart. Where the two sets of lines cross, from 35 to 40 acorns of good germinating quality are planted within an area of one square meter; thus on one hectare there will be 667 such nests. In the fall, after the agricultural crop is harvested, the ground between the longitudinal lines is disced and sown to rye. With the rye, three lines of *Caragana* seed mixed with seed of some other shrubs are also sown. These rows are located centrally between the lines containing the acorns. The following spring, half way between the acorn nests on the crosslines, a single nest of maple (*Acer platanoides*) is sown. Thus in the second year after the acorns are planted, the picture will be as follows: Groups of oak seedlings entering upon their second year of life—3 x 5 meters apart in the row; within the same row, 1.5 meters from the oak seedlings, recently planted nests of maple; between the oak rows, three longitudinal rows of seedlings of *Caragana* and other shrubs. The sowing of rye is to continue until the oak seedlings are four years old and the seedlings of *Caragana* and maple three years old. After that the forest strip is expected to suppress weeds by its own shade without further sowing of agricultural crops. The advantages of establishing forest strips by the nest method, it is claimed, lie in preventing the invasion of aggressive prairie weeds—the foe of both cultivated crops and young forest plantations—and in increasing the chances of survival of the oak seedlings as the principal tree in the forest strip. The method is being tried out on a large scale and, if successful, may become the standard method of planting.

Mensuration, Increment, and Yield

India

• A draft standard specification for coniferous sawn timber intended for further conversion has been prepared by the Timber Products Sectional Committee of the Indian Standards Institution to cover the various requirements of the trade and, in particular, those of the purchasing departments of the Central, Provincial, and State Governments. All aspects of coniferous timber have been classified into four grades. In addition to defining a number of terms used in the trade, the draft standard specifies in detail the requirements of the first three grades in regard to species of timber, dimensions, permissible defects, and estimated percentage of recovery of useful material. It is being circulated among timber interests for comment.

Protection

Australia

• Forestry officers in South Australia are finding mistletoe a destructive and costly pest, and they are using flamethrowers to destroy it. In various parts of the State there are ten or twelve species of the parasite, two of them confined to eucalypts and one attacking orange and olive trees. The most harmful are those species which live on eucalypts and acacias. In South Australia they are killing tens of thousands of valuable timber trees.

Israel

• In its final report for 1948-49, the Israeli Department of Forests indicates that "since the establishment of the State practically all goats in the country have disappeared, while the illicit cutting of trees and burning of charcoal have been completely checked. Thus the work of protection has been greatly facilitated and . . . improvement (is expected) in the growth of the natural 'forests'." Considerable progress has been made also in establishing and improving forest plantations and demarking and surveying for new plantations. The present area of forest reserves under government control is 28,700 hectares.

United States of America

• Several damaging fires in the National Forests of Montana, Idaho, and California have been reported by the U.S. Forest Service. The details of losses and costs will not be known for some time. In Montana and Idaho the fires were caused by lightning. In Montana, thirteen young parachute jumpers lost their lives in July in attempting to outrun a fire which suddenly blew up; the crew leader and other members of the crew saved themselves by burning out a spot ahead of the main fire and staying in it. Two or three firefighters lost their lives in California fires.

Such tragic events re-emphasize that suppressing forest fires is a hazardous business when fires suddenly misbehave —as they sometimes do. Fire leadership must often take calculated risks, but should always seek to have an emergency way out.

Union of Soviet Socialist Republics

• Experiments in combatting the ravages caused by the larvae of the June bug (*Amphimallon solstitialis*) and related species by dusting the roots of pine seedlings with 5 percent DDT and 6 percent hexachloran were conducted in 1948 in two forests of the Kharkov and Pskov provinces. The roots were dusted just as the seedlings were planted in soils heavily infested with the larvae of several species of beetles that feed upon pine roots. The workers who did the dusting and planting protected their noses and mouths with gauze and cotton bandages and were cautioned not to rub their eyes. No bad effects upon the skin were observed from either DDT or hexachloran. Hexachloran, however, affected the mucous membranes of the respiratory tract to some extent, but these effects disappeared as soon as the work stopped. The results as presented in detailed tables may be generalized as follows:

1. Dusting the roots of pine seedlings with DDT or hexachloran protects them from damage by June bugs during the first year after planting. The significant point is that the presence of these two poisons in the soil does not affect the normal development or the number of the larvae. No dead larvae were found in the soil. The poisons apparently only repel or "frighten" the larvae from attacking the roots.

2. Pine seedlings dusted with hexachloran showed a slower growth than the untreated seedlings in the control plots. No such effect was observed in the case of seedlings dusted with DDT.

3. The roots of the seedlings which were dusted with the poisons had a slightly lower resistance to climatic effects than the undusted seedlings, and the mortality among them from such causes was therefore greater. But this loss was more than compensated by the large number of healthy seedlings not injured by the larvae.

4. On soils heavily infested with larvae of the June bug, dusting with 5 percent DDT or 6 percent hexachloran can be recommended.

5. The amount of poison to be used per hectare depends on the number of pine seedlings planted. If the planting is at the rate of 10,000 per hectare, 15 to 17 kilograms should be used. If the rate is 20,000 seedlings per hectare, the amount must be doubled. These amounts, however, are tentative, needing further narrowing down.

Conversion

United Kingdom

• The results of a field service test carried out to determine the natural durability of different timbers in a temperate country are given in Forest Products Research Record No. 30, published by the U.K. Department of Scientific and Industrial Research. The report considers that it is unjustifiable to go beyond a classification of the timbers into a number of broad groups, according to relative durability. The results apply specifically to durability against fungal decay and are not necessarily applicable where other destructive agencies, such as termites, marine borers (*Terredo navalis*), mechanical wear, or weathering are involved. In most industrialized countries, antiseptically treated wood is now replacing naturally durable timbers for use in structures which are subject to decay. Where preservative treatment is possible, there is generally no point in using a naturally durable timber solely to avoid decay, since much better service can usually be obtained from a treated timber which has been selected for its ability to take preservative treatment well. For instance, pressure-creosoted redwood poles have given more than seventy years' service without failure, and there is every reason to believe that they are capable of even longer service. This is well beyond the capabilities of most structural timbers in their natural state. The chief function of data on natural durability is to indicate when a timber can safely be used in its natural state, and when it requires protection by preservative treatment. The nature of the service conditions under which it will be used must, of course, be clearly established.

UNION OF SOVIET SOCIALIST REPUBLICS

• There are now some forty types of Russian power saws. Some are already factory-produced; others are coming up for production or are still in the experimental stage. They combine chain saws with or without H. F. motors, disc saws, and bow saws. The types with H. F. motors are regarded as the most promising. Saws operated with H. F. current (200 cycles) are less than half as heavy as those run on normal current. Until special generators are mass-produced in the U.S.S.R., it will be necessary to adapt existing equipment to supply H. F. current by the use, for instance, of special transformers for converting ordinary (50-cycle) A.C. to the requisite frequency.

Utilization

UNION OF SOVIET SOCIALIST REPUBLICS

• Apparently the chief pulpwood used in papermaking in the Soviet Union is spruce. Pine is used, but only for the production of sulphate pulp. Its use in the production of sulphite pulp is limited because of its high resin content, varying according to region and age between 3 and 8 percent. The resin content of spruce pulpwood, on the other hand, ranges between 1 and 1.25 percent. A number of experiments have been carried on in an attempt to eliminate the technical difficulties in paper and cardboard making arising from the presence of resin. These difficulties result from the interaction between the chemical components of the resin and the carbonate salts of the water (the hardness of the water). There are two solutions: one is to solidify the components of the resin so that it can spread uniformly over the wood fibers. This can be accomplished by treating the groundwood mass with a mixture of lime and caustic soda or of lime and ordinary salt (sodium chloride). The other is either to avoid the use of water containing carbonates or, if no other water is available, to use chemicals to neutralize the hardness of the water.

The accumulation of resin as measured on ground steel or bronze plates (200 mm. by 150 mm. in size) inserted in the rollers amounted, in the course of the first 24 hours, to 8.5-11 grams per square meter when the cellulose was not treated by a mixture of lime and salts; it decreased to 1-3 grams when so treated. In summer the deposit of resin on the plates reached 22.5 grams per square meter for untreated cellulose. The experiments conducted at three different paper mills led to the conclusion that the technical difficulties caused by the high content of resin in pine pulpwood can be overcome and that the treatment does not affect the quality and color of the paper. The dosages recommended are 1 percent of calcium oxide (CaO) and 0.6 percent of salt (NaCl) in relation to the weight of the cellulose mass. Another point to keep in mind is that the flow of the lime solution should be uninterrupted and of a constant concentration (10-15 gm. per liter).

Economics and Statistics

AUSTRIA

• According to a plan prepared by the Austrian timber industry, the sum to be reserved from ERP funds for modernization of the industrial plants amounts to 21 million schillings (equivalent to about 2.1 million U.S. dollars) during the period 1 July 1949 to 30 June 1950. The Austrian sawmill industry would get a total of 6 million schillings to enable it to compete with foreign markets. The plywood industry, which would have to bring its equipment up to date, would have 10 million schillings at its disposal. It is estimated that modernization would enable the industry to export plywood at an annual value of 40 million schillings. The fiberboard and furniture manufacturing industries would each have an allocation of 2 million schillings. The extension of the furniture industry would make it possible to meet the demand for inexpensive furniture and, in addition, to export furniture. Finally, investments in the minor woodworking industries would amount to 1 million schillings.

BURMA

• The timber industry in Burma is suffering severely from the unsettled political conditions, and is operating at considerably below the prewar level. Teak and other hardwoods are in short supply in Rangoon and sawmills are working at about half capacity, substantially reducing the amount of timber available for export. The demand for teak continues strong, and prices have been maintained or increased to offset losses and higher costs. Other hardwood prices, however, have dropped in many markets as a result of cheaper supplies from other exporting countries. It is increasingly difficult, therefore, for Burma to sell in the export market at prices sufficient to cover costs.

CANADA

• Canadian exports of wood, wood products, and paper for the six months January-June 1949 were valued at Can$408,186,000. Exports for the corresponding period of 1948 were valued at $453,334,000, and of 1938 at $94,640,000.

CHINA

• The Kwangtung Provincial Paper Mill near Canton, the largest newsprint mill in prewar China, had been returned from Japan and, before recent political developments, was expected to begin operations by the end of 1949. This plant first began operations in July 1938 but was seized in October 1938 by the Japanese and later shipped to Hokkaido, where it operated during the war years. Before the war, the plant had a daily capacity of 50 metric tons of newsprint. The mill could probably now produce no more than 42 tons per day. The reconstruction of this plant would be a major element in the over-all rehabilitation of the paper industry in China, particularly if domestic production of adequate supplies of newsprint is to be assured. Three other small mills have been operating in Kwangtung. Their combined capacity is 13 tons per day.

PHILIPPINES

• In the twelve months ended 15 April 1949, log and timber production in the Philippines reached the record figure of more than 2.25 million cubic meters. This exceeds somewhat the quantity cut in 1938. Most of the output was retained for the domestic market, the value of timber exports being estimated at approximately 4 million pesos (US$2 million). Prewar exports of lumber and timber averaged 6-7 million pesos.

POLAND

• The State Forest Service of Poland estimates that 400,000 hectares of forest were clear-cut and 600,000 hectares heavily overcut during World War II, the total drain being close to 100 million cubic meters. In 1948 wood production amounted to 10.5 million cubic meters. Forest planting has been carried out on 88,000 hectares.

TRINIDAD

• The first shipment of teak logs from Trinidad was made in 1947, and consisted of 150 cubic feet (4 m^3) exported to Jamaica. New areas of teak have been planted during recent years at the rate of 500 acres (200 ha.) annually. At the end of 1947 the area planted amounted to 6,926 acres (2,803 ha.), and it is planned to have a total of 27,000 acres (11,000 ha.) under cultivation during the next 40 years. Teak planting, which began in 1913 with seed from Burma, is combined with the growing of hill rice, maize, and other food crops. Trinidad has supplied teak seed to the Caribbean islands, Venezuela, Ecuador, and Colombia during the past ten years. Jamaica and Puerto Rico have been the largest importers of seed.

UNITED KINGDOM

• The second report of the Colonial Primary Products Committee gives the following details on the possible extent of colonial hardwood exports:

	Average—1936-38		Estimated—1952-53	
	1,000 cu. ft.	*1,000 m^3(r)*	*1,000 cu. ft.*	*1,000 m^3(r)*
Gold Coast	—	—	8,010	227
Nigeria	2,115	60	4,005	113
Tanganyika	90	3	990	28
Kenya	180	5	540	15
British Guiana	495	14	2,250	64
British Honduras	3,420	97	1,800	51
British Borneo	8,595	243	4,005	113
	14,895	422	21,600	611

The report emphasizes that any program to intensify colonial timber production must be carefully related to a program of protection and regeneration on a similar scale. The forests are among the most important of the capital assets of colonial peoples, and it is obviously a principle of the first importance that these assets should be used to the best advantage. While it will be a very long time before softwood production can be developed on a large scale, the hardwood exports of British colonial territories are capable of very substantial expansion, but the prerequisites are a great improvement in the supply of machinery, the improvement of communications, and increased staff. For these reasons, the maximum production cannot be obtained for some years. There is much room for research both in silviculture and conservation and, more particularly, on utilization. Maximum production also depends on full use of all timber with a commercial value. This includes the development of veneer and plywood manufacture in the colonies and the increased conversion of logs (particularly secondary timber) in the country of origin, to economize on freight by transporting the timber in a semi-processed form.

As regards the possibility of pulp supplies, the report concludes that while there are a number of lines of inquiry which can be profitably pursued, particularly on eucalyptus and wattle (*Acacia* spp.), there is at present no project which can be confidently recommended as a practical proposition. Wattle is considered likely to prove by far the best source of vegetable tanning materials in colonial territories, and its cultivation should be given every encouragement, particularly on the highlands of East and Central Africa, where it can be grown without encroaching upon local food production.

Policy, Legislation, and Administration

NICARAGUA

• Under the provisions of a Presidential Decree of January 1949, a Nicaraguan Department of Forestry has been created as a branch of the Ministry of Agriculture and Labor. The new department will have control over all forest conservation measures, reforestation of all suitable lands, and enforcement of existing forest laws. It is planned to establish nurseries of forest trees in various areas of the country, which will supply planting stock for the reforestation program. The new department is also preparing a forest map of Nicaragua.

RUMANIA

• By a decree of April 1948 a new independent Ministry of Forestry was created in Rumania, where previously all forest affairs had been handled by the Ministry of Agriculture. The new Ministry began a sweeping reorganization of the entire forest administration. Beginning with 1949, some 11,000 personnel of all categories, including forest rangers, forest guards, and other forest workers will be recruited into the Forest Service. The increase in personnel will make it possible to reduce the forest units under the supervision of one trained forester to only several hundred hectares, while in the past, in some regions, tens and even hundreds of thousands of hectares were supervised by one single forester. Forest research under this reorganization is to receive a new impetus. In the prewar days the forests were owned by religious bodies, the royal house, and other private owners. Now, with practically all the forests under public ownership, facilities for practical implementation of research findings and for increased productivity both of the forests and of forest labor are readily available. At present, the conifer forests of the eastern Carpathians are considerably devastated. In the prewar period the annual cut of conifers exceeded the normal annual growth by two to two and a half times. The oak forests were treated in much the same way. Because of the great demand for firewood and the high price it brought, high-grade beech timber was cut into cordwood.

The entire forest area is divided into twenty-eight regional units, responsible to the central administration. Each unit has complete control over timber cutting, transportation facilities, sawmills, and all forestry equipment and installations within its administrative boundaries. They are similar in character to the Soviet Union's "Timber Trusts."

SWEDEN

• In a small booklet, "The Exodus from the Forest Areas," the Swedish Institute for Industrial, Economic, and Social Research deals with a serious problem of the timber industry. The investigation upon which the report is based was conducted in the valley of Klaralven, in the province of Varmland, and was confined primarily to three rural communities.

From the results of the survey it is clear that a remedy for the exodus of forest workers is difficult to find. The tendency to leave is stronger among them than in other occupations. In the three communities, more than 60 percent of the forest workers questioned want to move because they are dissatisfied with their work, as compared with 30 percent of the workers in other occupations. Whereas formerly forest workers were willing to travel long distances from their homes for winter work in the forests, nowadays they will accept work only near their villages so that they can be home by night. Employment is unsteady. One-third of the forest workers in the three localities work less than fifteen days a month in the forest. Daily income varies considerably, reflecting the importance of aptitude and skill in this type of work. Drivers—that is, farmers owning their own horses—are easily found, but there is a serious shortage of loggers, their number having decreased by approximately 50 percent between 1938 and 1946.

Suggested remedies include the finding of year-round employment for forest workers; the establishment of local industries to provide income supplementary to that derived from the small farms, which are below subsistence level in this region; greater concentration of population in larger villages, or else the establishment of small communities closer to lumbering sites. However, each of these solutions has disadvantages as well as advantages, and much thought and effort will be needed before satisfactory solutions can be found.

UNITED KINGDOM

• It is reported that 90 percent of the manufacturers of chipboards have combined to form a British Chipboard Manufacturers' Association which will stimulate general co-operation among producers, establish minimum standards, promote the use of bonded fiberboards, and present the co-ordinated views and policies of members to Government departments and other bodies.

Personalities

• The Government of India has appointed Mr. M. D. Chaturvedi, formerly Chief Conservator of Forests, United Provinces, as Inspector-General of Forests, Ministry of Agriculture. He replaces Mr. A. P. F. Hamilton, who has retired after long and distinguished service in India.

• Mr. B. Clarke has recently joined the staff of FAO's Forestry and Forest Products Division from Australia. After graduating from the Australian Forestry School at Canberra in 1936, Mr. Clarke took up duties with the New South Wales Forestry Commission, and prior to joining FAO he was Senior Forester responsible for reforestation and research projects in the Coffs Harbour Forestry District of New South Wales. The reforestation projects included the establishment of exotic coniferous plantations on marginal land and the natural regeneration of the eucalypt forest. The major research problem was the determination of the best silvicultural treatment for the subtropical forests of this region. Mr. Clarke also served as the Forestry member of the Clarence Regional Development Committee, which was one of the committees set up by the Government to advise the State and Federal authorities on the development of resources and the control and use of land.

Meetings

• The first Brazilian Conference on Forestry and Forest Products was held in Rio de Janeiro from 21 June to 2 July 1949. Mr. Pimentel Gomes, Director of Forests of Brazil, organized the meetings, and Dr. Luciano Pereira da Silva, President of the Federal Forestry Council, served as chairman. The findings of the Teresopolis Conference and of the first session of FAO's Latin-American Forestry and Forest Products Commission formed in part the basis for discussion, out of which a series of recommendations were passed and immediately transmitted for study and action to the Federal Council on Forests and to the Commission for the Development of the Amazon Valley.

The following were among the more important actions recommended: (1) creation by the Federal Council of a permanent Forestry Commission and the establishment of a close liaison between the Federal Forest Service and the Services of the individual states; (2) creation of a "Forest Fund" for financing silvicultural operations and industrial wood-processing operations; (4) undertaking of studies recommended by the FAO Latin-American Forestry and Forest Products Commission, with a view to: (a) rationalizing and modernizing exist-

ing industries and building new integrated industries based on the application of modern techniques, (b) improving trade and marketing conditions by diversifying production, improving quality, standardizing products, etc.; (4) expansion of the Institute of Technology; (5) creation of a competent Federal agency for the compilation and publication of statistics on forestry and forest products. Resolutions were also passed concerning the protection and development of forest resources, the organization of the Forest Services, legislation, education, inventories and, above all, improvement in the living standard of forest workers.

Further subjects—namely, the creation of national parks in Santa Catarina and the establishment of colonization centers in the Territory of Aquiri and the Amazon Valley—were studied in detail, and a report is to be submitted to the Federal Council. The next meeting of the Conference will take place in 1950.

• A National Emergency Conservation Conference was convened in Washington by the Public Affairs Institute from 12 to 14 May 1949. It proposed a plan to encourage the progress of forestry and other natural resource activities in the United States, and set up machinery to press for adoption of an energetic action program. On the opening day a specific proposal, "An Action Program for the Redwood Forests," was placed before the Conference. It received approval as an initial project in the more general program which the Public Affairs Institute has in view.

• The Society of American Foresters met from 10 to 15 October 1949 at Seattle, Washington. Subject division meetings were held pertaining to private forestry, forest economics, forest recreation, forest products, forestry education, forest wildlife management, range management, silviculture, and public relations. Dedication of the Gifford Pinchot National Forest—formerly the Columbia National Forest, which was renamed by a Presidential proclamation of June 1949—followed the meeting. Gifford Pinchot was the first president of the Society of American Foresters, which was organized in 1900. The Society now has a membership of 6,500 technically trained foresters in the United States and Canada, with headquarters in Washington, D. C. The *Journal of Forestry*, a professional monthly magazine devoted to all branches of forestry, is its official publication.

• An International Conference on Wall boards was held on 16 September 1949 in Cambridge, Massachusetts, U.S.A., by the Northeastern Wood Utilization Council in co-operation with Harvard University. Specialists from Italy, Sweden, Switzerland, and the United States reported on both the dry and the wet process of manufacturing wallboards from wood and wood waste. The production of hardboards was stressed. The program included papers by six manufacturers of wallboard products who have been operating on a commercial scale with proven results. New developments in resins were discussed by the Monsanto Chemical Company, and equipment developments by the Lake Erie Engineering Corporation.

Reviews

Trees. The Yearbook of Agriculture, 1949. United States Department of Agriculture. Pp. xiv + 944, illus. Government Printing Office, Washington, D. C. 1949. $2.00.

The United States Department of Agriculture has dedicated its 1949 Yearbook to forestry. This volume, entitled *Trees*, first considers the tree as a unit, a living thing; next, the tree as a member of a small group—in cities and around homes; finally, trees growing together in wood lots, groves, and forests, large and small. The main section ends with chapters on specific problems and values. Charts, tables, a glossary of unusual terms, and references for reading are given for those who wish to pursue the subject further. For the first time in the Yearbook series, the world situation is reviewed in relation to that of the United States. The many articles gathered together in the volume were written by competent experts. But the book is addressed to the intelligent layman, rather than to the specialist; each article, though technically sound, is written in the language of everyday usage. The edition of 300,000 copies is distributed largely to laymen in the hope of bringing about better public understanding of the importance of trees in individual and community life and increased knowledge of the proper management and use of forests.

Home Timber Production 1939-1945. Russell Meiggs. Pp. 277. Crosby Lockwood and Son, Ltd. London. 1949. 15/—.

Before World War II the forests and woodlands of the United Kingdom yielded little more than 4 percent of the country's total timber consumption. Few people would have believed then that these same forests and woodlands, during six years of war, could supply nearly two-thirds of the timber required for war needs, some 18.5 million tons. But this is what actually was achieved by real cooperation, with the home timber trade and forestry services bearing the major share of the burden, at the price of cutting 46 percent of the timber standing at the outbreak of war, most of it on the estates of private landowners.

An Oxford University fellow who became Chief Labor Officer of the Home Timber Production Department of the Ministry of Supply describes in this book how it was done, and it makes a very interesting story. As Sir Gerald Lenanton, wartime Director of Home Timber Production, says in a foreword: "This book is more than the tale of a great achievement. It is a text book which will be invaluable should the forests of England, Scotland and Wales ever again be called upon to supply, even for a short period, the bulk of our needs."

The inevitable slaughter of immature stands destroyed the balance of woodland economy and left the future prospect considerably poorer. Not until the large-scale plantings of the interwar period come to maturity can a sound balance be restored. The Forestry Commission is making use of the expensive lessons of two wars and will be there to remind the Government of them.

The Forestry Directory. Compiled by Tom Gill and Ellen C. Dowling. Pp. 420. American Tree Association, Washington, D. C., U. S. A. 1949. $3.00.

The 1949 edition of the Forestry Directory is the sixth of a series which was begun in 1927, and is the first one to be published since the 1943 edition. It answers a multitude of questions such as what is being done in international forestry and what organizations are active in this field; what forestry schools offer professional training in forestry; what organizations are interested in conservation and to whom to write to find out more about their work; how the different parts of the U. S. Government practice forestry and conservation; when Arbor day is celebrated in the different parts of the United States; and what makes up a good reading list of forestry books. In the foreword, Randolph G. Pack, President of the American Tree Association, points out the considerable progress in forest conservation in the United States during the past six years. Special note is made of the recognition achieved by forestry on a world basis through the establishment of the Division of Forestry and Forest Products in the Food and Agriculture Organization of the United Nations, as well as the tremendously increased financial support for conservation work by government, private industry, and private organizations interested in conservation. He concludes that "It is an impressive record, and an encouraging sign of widespread acceptance of the basic importance of forests in our economy."

United States International Timber Trade in the Pacific Area. Ivan M. Elchibegoff. Pp. 302. Stanford University Press, Stanford, California, U. S. A. 1949. $7.50.

The author has undertaken a task even wider than that indicated by the title. Not only has he presented considerable general and statistical information on timber production and trade, but he has also devoted almost one-third of the book to chapters on land utilization and forest resources of the Pacific countries—that is, all the countries of Asia, the Soviet Union, Oceania, North, Central, and South America, facing on the Pacific Ocean. Political and economic factors af

fecting timber supplies and trade are also covered.

The author is to be commended for the great care he has taken to reveal the sources of his information. In some fields additional information has become available since his work was completed. Much more remains to be collected, particularly on needs and requirements in the Pacific area. As a source book, however, gathering together in one volume a variety of detail, this volume should be of particular interest to students and businessmen. Readers will not always agree with the author's personal expressions of opinion, but none will deny the industry with which he has assembled his material.

Die Vegetation Osteuropas. (Vegetation of Eastern Europe.) Heinrich Walter. Pp. 180, with 19 text illustrations, 8 tables, and 1 colored vegetation map. Berlin: Paul Parey. Second revised edition, 1943. RM 7.40.

This is a study of the relationship of climate to forest vegetation zones and soil types. Eastern Europe, which includes practically all of European Russia, offers an ideal ground for such a study. European Russia is an enormous stretch of land, extending from the North Sea over 25 degrees of latitude (45° to 70°) and for nearly 2,500 kilometers in an east-west direction. It is a low-lying plain, mountains occurring only on its rim—the Urals on its eastern borders and the Caucasus in the south. No high elevations affect the natural distribution of the forest vegetation, which for this reason becomes the direct expression of the climate prevailing in the different parts of the plain. The soil types in the plain of European Russia are less affected by the geology of the underlying rock than by the climate and the forest cover. Consequently the forest vegetation becomes the expression not only of the climate, but also of the soil characteristics. As the natural vegetation is the integrated effect of climate and soil, it is therefore also indicative of the possibilities of the land for agriculture, pasture, or any other economic use. The most striking and obvious correlation between climate and zonal distribution of the vegetation is presented by the tundra, forest belt, steppes (prairie), and semideserts or deserts. The author analyzes these broad vegetation belts in great detail, emphasizing the close relation of type of vegetation and land use to climate and soil. The tundra belt is divided into the treeless tundra and the forested tundra (with or without Siberian larch). The greatest attention is, of course, given to the forest belt because it occupies the largest part of the plain and also because of its present and future economic values. The forest belt is divided into a pure conifer forest without admixture of broadleaf species, a mixed forest of conifers and broadleaf species, and a pure broadleaf forest. Similarly the author defines nine different types of steppes and five types of desert and semidesert vegetation. A colored map brings out clearly all these distinctions. The study is not only useful as a contribution to ecology, but is of practical significance as an aid to understanding the economic potentialities of this vast region.

Morphology and Structure of Wood Fibres. Hans Bucher and Louis Pierre Widerkehr-Scherb. Research Laboratories of the Cellulosefabrik Attisholz AG. Attisholz, Solothurn, Switzerland. 1948.

This publication surveys research work on the morphology and structure of wood fibers begun in 1943 at the laboratories of the pulp plant at Attisholz, Solothurn (Switzerland). Systematic microscopic studies of pulp fibers were carried out by the authors, with the aim of establishing photographic documentation of the different kinds and qualities. One author studied wood structure and wood digestion, the structure of the cell wall, and discontinuity in fiber structure; the other studied the changes of pulp fibers during manufacture—that is to say, the effects of beating and formation of sheets. Further investigations dealt particularly with the structure of bordered pits and the swelling and dissolving of pulp fibers in cuprammonium hydroxide. The publication contains an extensive bibliography on the subject and 153 excellent photographic reproductions.

Boden und Wald. Unter besonderer Berücksichtigung des nordeuropäischen Waldbaus. (Soil and Forest. With special reference to the forestry of northern Europe.) V. T. Aaltonen. Pp. 457, with 124 illustrations. Berlin and Hamburg: Paul Parey. 1948. DM 24.

This book is a German translation, revised and enlarged, of the Finnish textbook *Metsämaa* (Forest Soil) by V. T. Aaltonen, professor of forest soils at the Forest Research Institute in Helsinki, Finland. It deals only with soils of mineral origin. Organic soils, such as peat, which widely predominate in northern countries, are omitted because studies of their properties and utilization have been carried on by many other investigators. The book is regional in scope; it deals with soil-forest relations as they exist in Norway, Sweden, and Finland. Nevertheless the findings in a large measure hold true for the northern latitudes of America and Asia. Unlike many other writings on forest soils, the approach is not that of a geologist or soil scientist but primarily of a forester who has taught the subject of forest soils for nearly 20 years at the Forest Research Institute.

The subject matter divides itself into four main parts. Part 1 is in the nature of a background—a survey of the geology and climate of the region and a description of the soil-building processes, soil types, and forest types. These types are described in great detail and are an elaboration of Cajander's types based on the characteristic ground vegetation of the forest floor as a truer criterion of the potentialities of the soil than the composition of the forest stand itself. Part 2, which forms the bulk of the book, is devoted to an analysis of the effects of the forest upon the physical, chemical, and biological properties of the soil; its effects upon the water regime of the soil; its enrichment of the soil with chemical elements resulting from the decomposition of dead leaves and needles; the formation of humus and its role in soil building. Part 3, entitled "The Fertility of the Forest Soil," discusses the different physical properties of the soil; the effect of its mineral and microbiological content upon the growth and the development of the forest, and the deterioration of the soil as a result of erosion, forest fires, and land clearing. Part 4 traces the effect of interaction between forest and soil upon the internal changes that go on within the forest as a result of the struggle between the individual trees for growing space and light, and also the effect of different methods of forest management upon the maintenance of soil fertility. The author has succeeded in bringing together in one volume all the available up-to-date knowledge on the relation between soil and forest in a scholarly, painstaking, and factual manner. The work should prove a useful handbook for all students of forest soils.

Forsteinrichtungslehre. (The Theory of Forest Regulation.) Wilhelm Mantel. Pp. xii + 228. Hamburg: Verlag Neuman-Neudamm. 1949 reprint of 1942 edition. DM 12.

Forsteinrichtung als nachhaltige Betriebsführung und Netriebsplanung. (Forest Regulation — the Basis of Sustained Management and Planning.) Gustav Baader. Pp. viii + 337. Frankfurt am Main: J. D. Sauerländer. 1945. DM 15.

These two textbooks on forest management in theory and as the basis for sustained-yield management are written in the classical tradition of the German concept of forestry. Mantel's textbook is a reprint of an earlier edition (1942), and Baader's book is dated 1945; but it is evident that both were planned before World War II. Although the subject matter of the two works is very similar—taking of forest inventories, regulation of the cut, growth, orderly arrangement in space, etc.—arrangement and approach differ. Baader, as a professor of forestry, deals principally with the underlying theory and basic principles; whereas Mantel, as an *Oberforstmeister*, views the problems more concretely from the standpoint of a forest administrator for whom sustained yield is only a part of the entire plan of forest management.

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THE Nations accepting this Constitution, being determined to promote the common welfare by furthering separate and collective action on their part for the purposes of

raising levels of nutrition and standards of living of the peoples under their respective jurisdictions,

securing improvements in the efficiency of the production and distribution of all food and agricultural products,

bettering the condition of rural populations,

and thus contributing toward an expanding world economy,

hereby establish the Food and Agriculture Organization of the United Nations . . . through which the Members will report to one another on the measures taken and the progress achieved in the fields of action set forth above.

—Preamble to the Constitution of the Food and Agriculture Organization of the United Nations

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